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Strannemalm

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(54) **ABSORBENT ARTICLE COMPRISING ONE OR SEVERAL PATTERNS**

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A61F 13/15 (2006.01)

(52) **U.S. Cl.** **604/361**; 604/385.24; 604/385.25; 604/385.26; 604/385.27; 604/385.3; 604/386; 604/387

(58) **Field of Classification Search** 604/361, 604/385.24, 385.25, 385.26, 385.27, 385.3, 604/386, 387, 396
See application file for complete search history.

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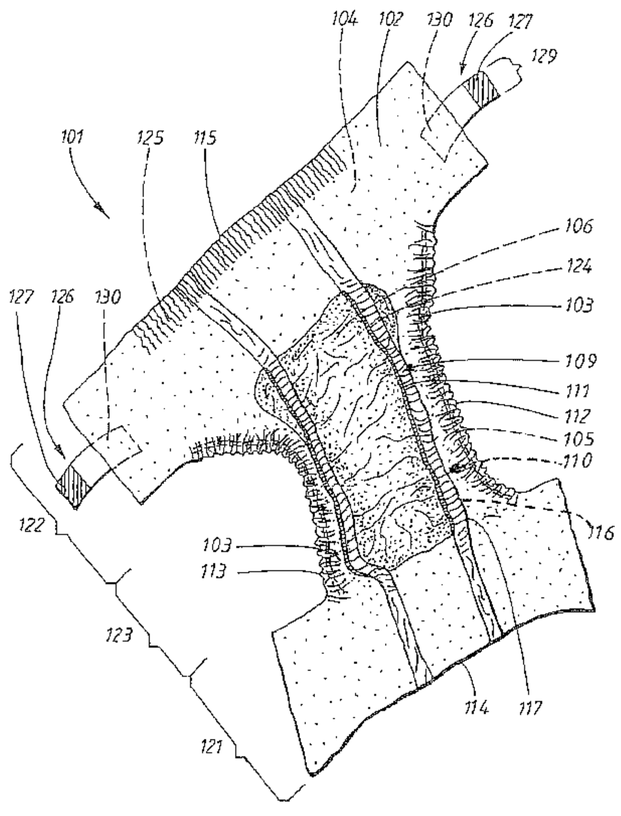
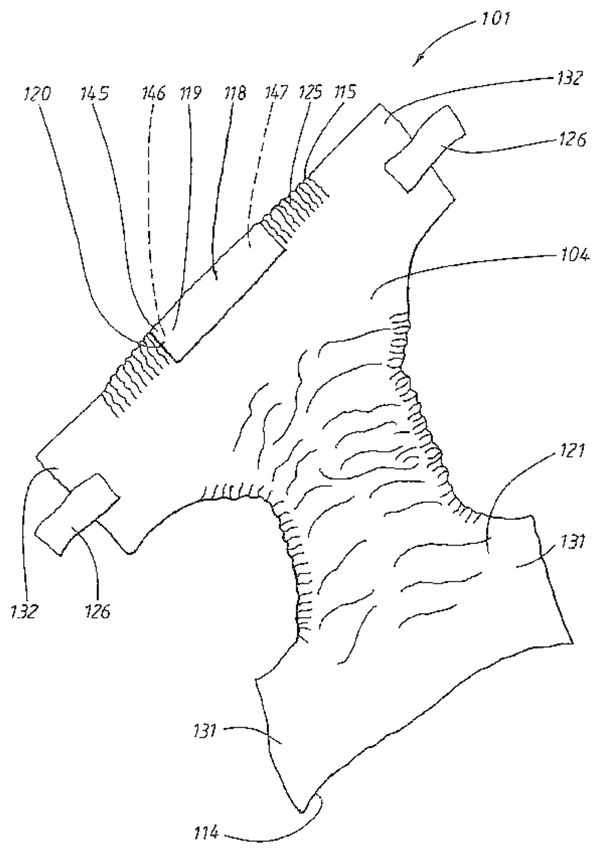
(74) *Attorney, Agent, or Firm* — Buchanan Ingersoll & Rooney PC

(57) **ABSTRACT**

An absorbent article for disposable use having at least one pattern (**118**) in the form of a text, image or the like. A background layer (**146**) and at least one intermediate layer (**147**) are arranged behind the pattern (**118**), in conjunction with which the intermediate layer or layers (**147**) exhibits or exhibit a first, essentially transparent state, and in conjunction with which the intermediate layer or layers (**147**) is or are transformed into a second, more opaque state when it or they is or are stretched.

20 Claims, 10 Drawing Sheets





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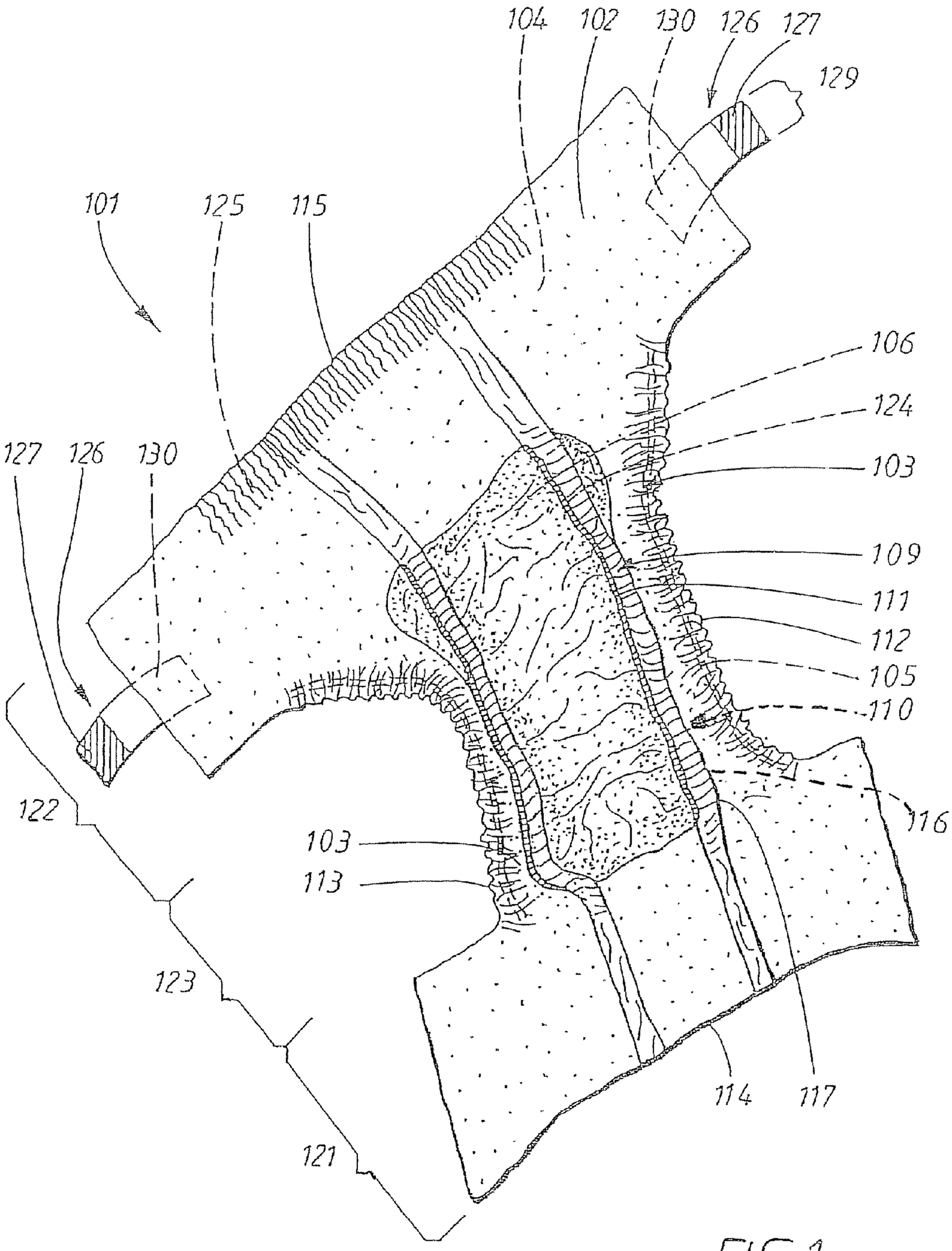
104
102
130
126
127
129
101
125
115
106
124
103
127
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130
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111
112
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122
116
103
113
123
114
117
121

FIG.1a

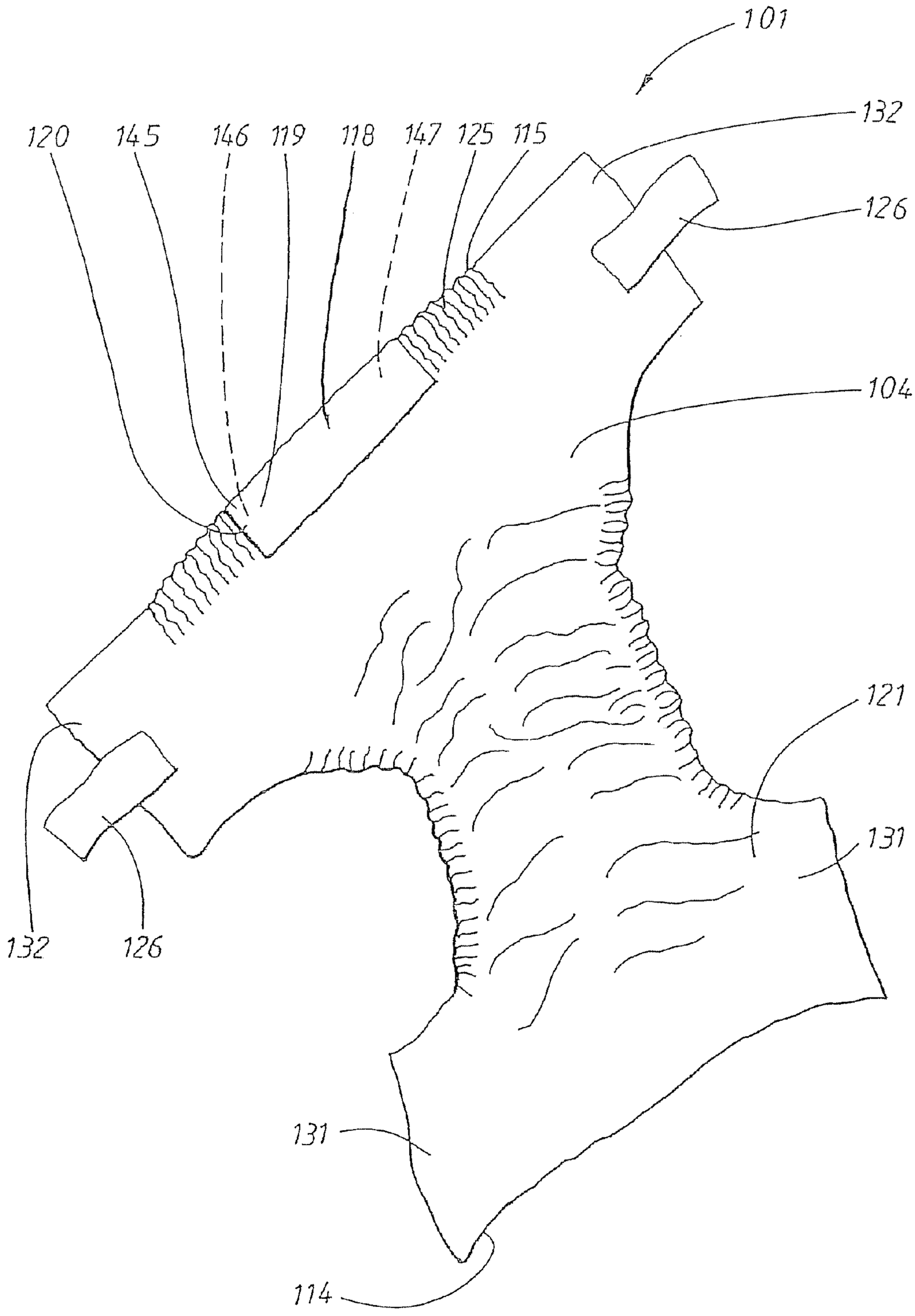
101
120
145
146
119
118
147
125
115
132
126
104
121
131
132
126
131
114

FIG.1b

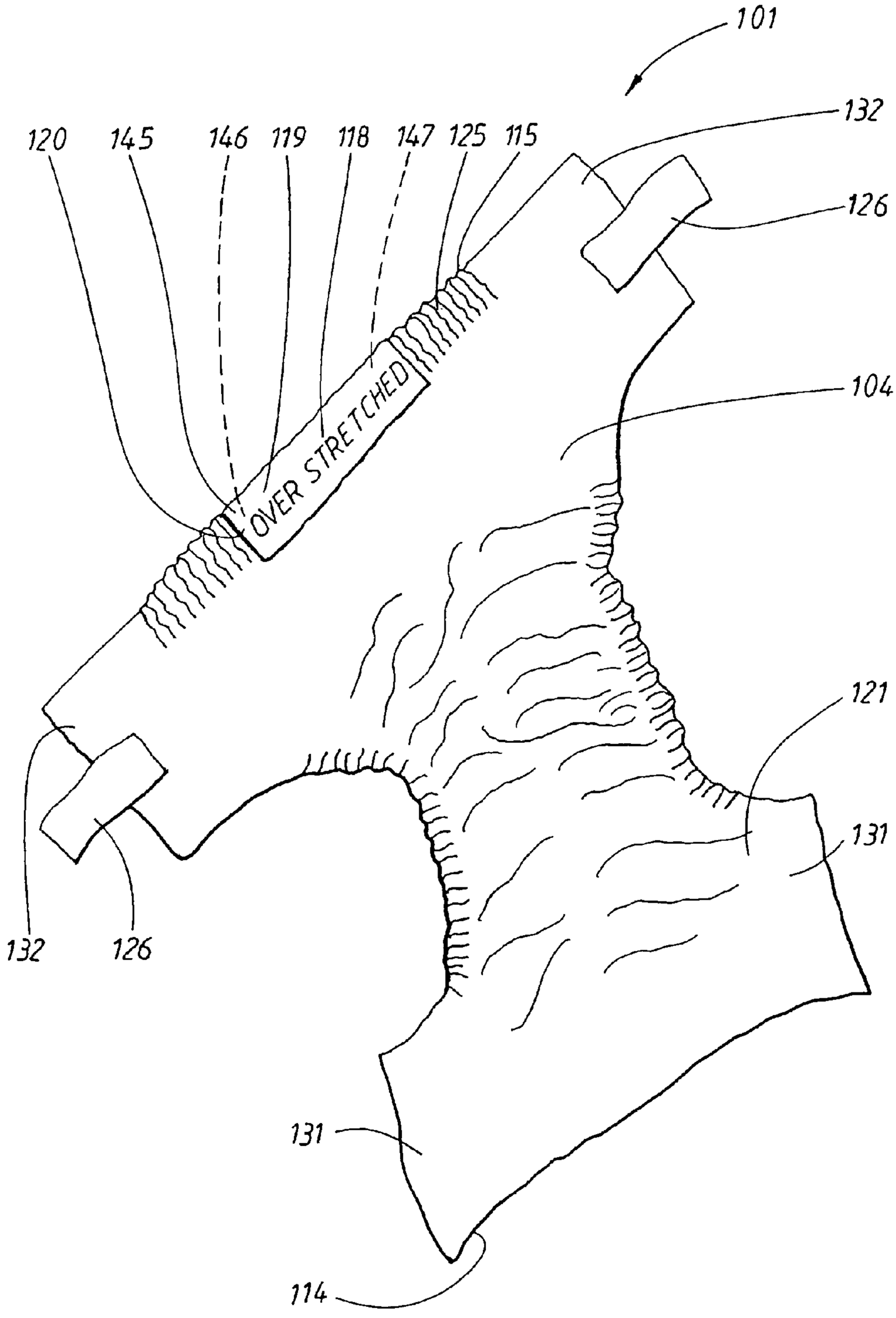
101
132
120
145
146
119
118
147
125
115
126
OVER STRETCHED
104
121
131
132
126
131
114

FIG.1c

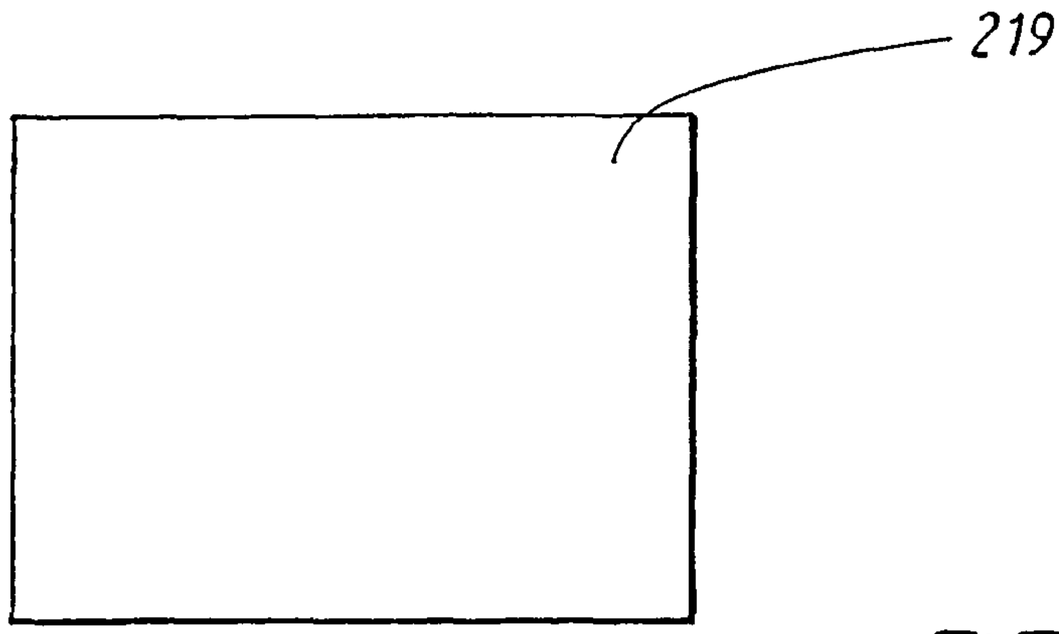

FIG. 2a

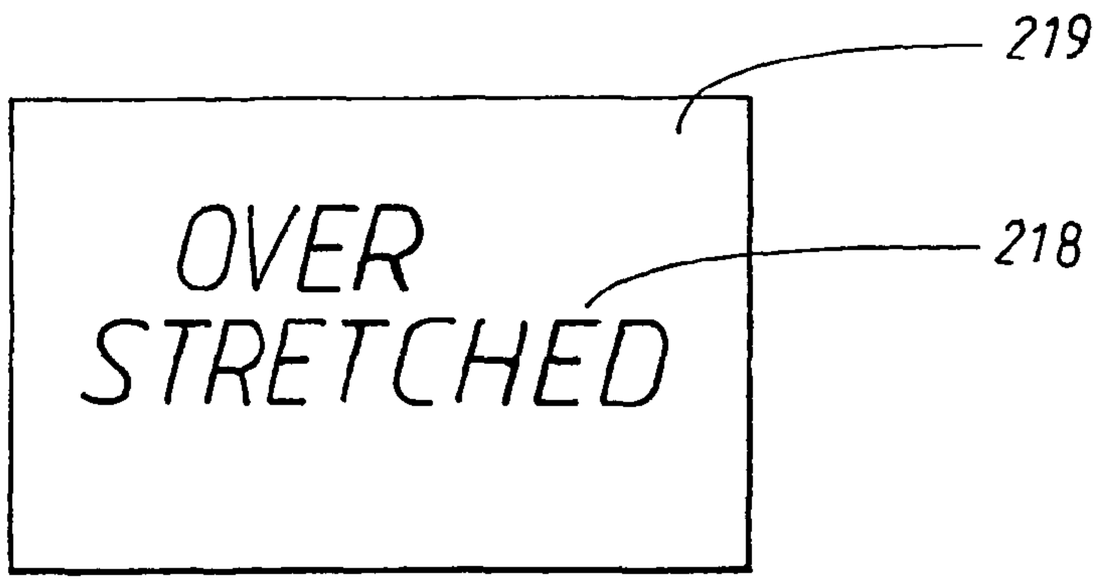

FIG. 2b

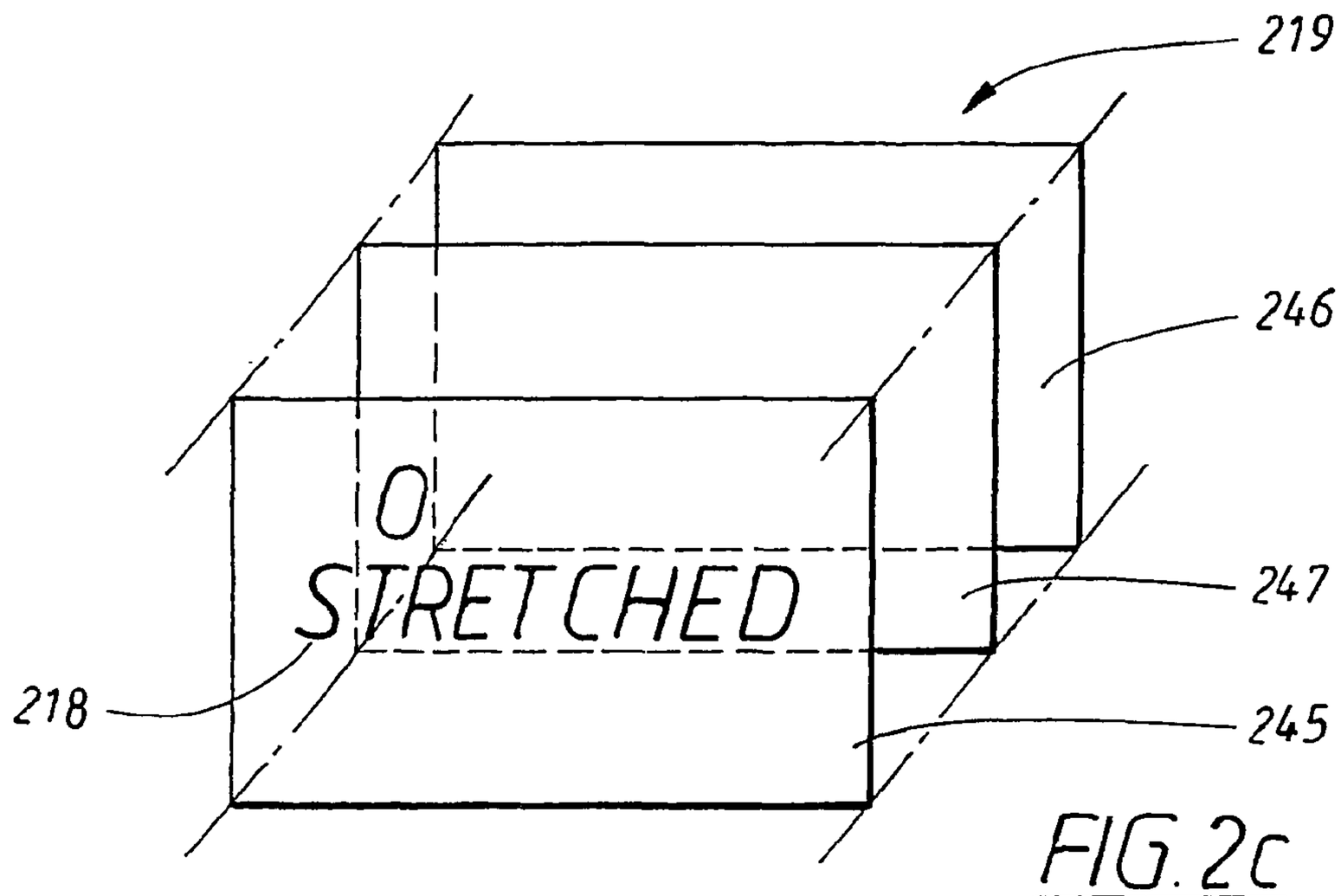

FIG. 2c

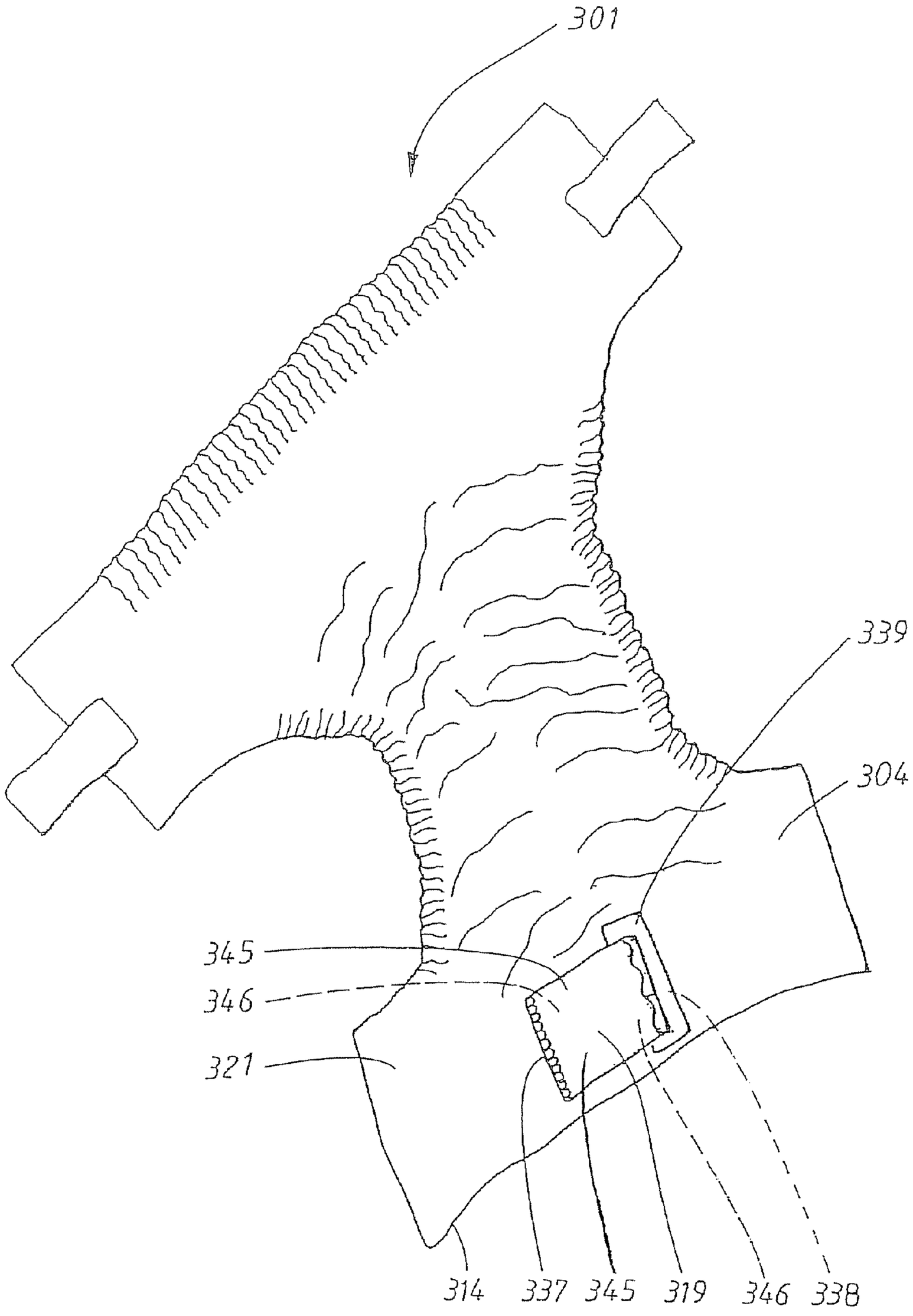

FIG. 3a

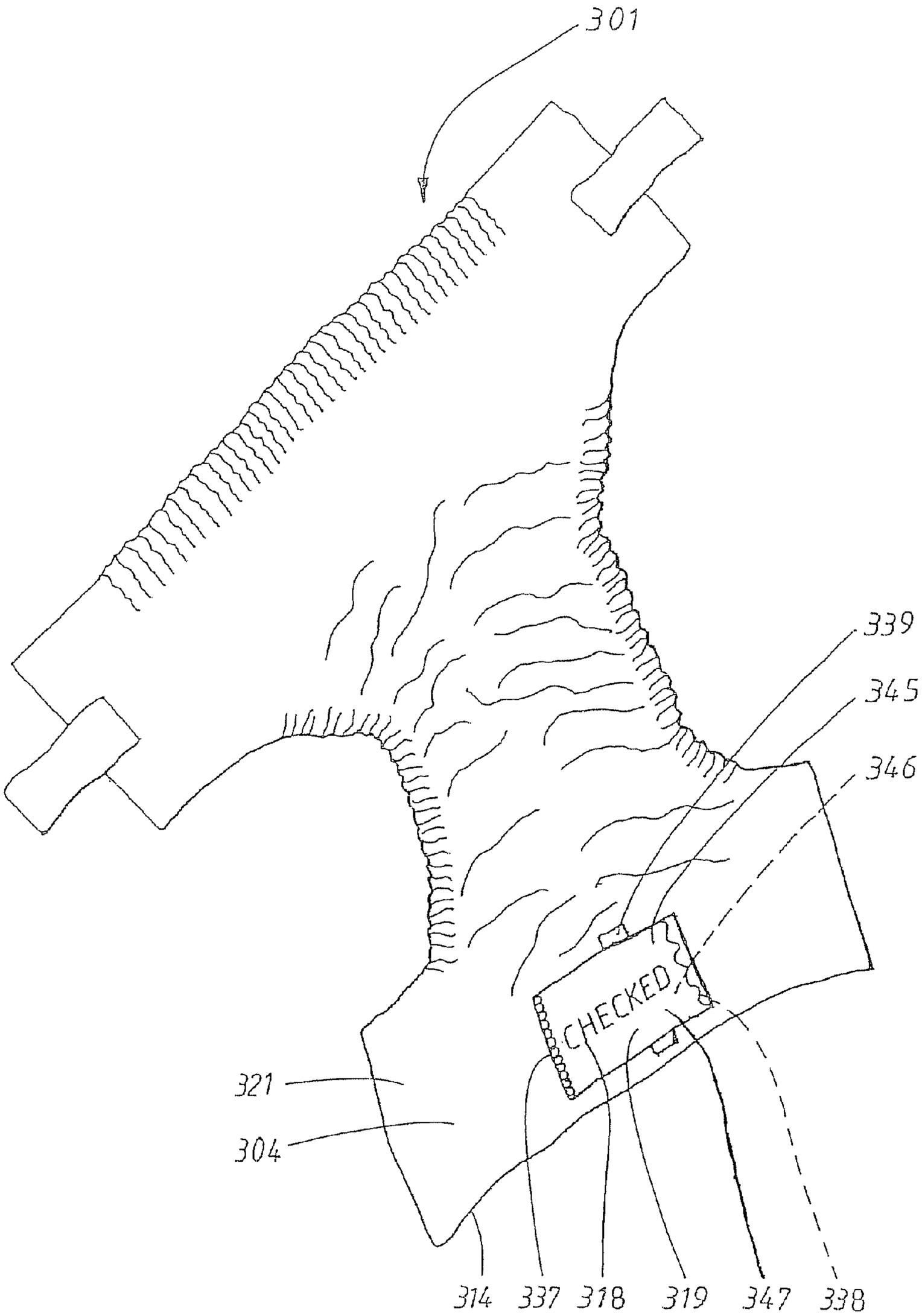

FIG.3b

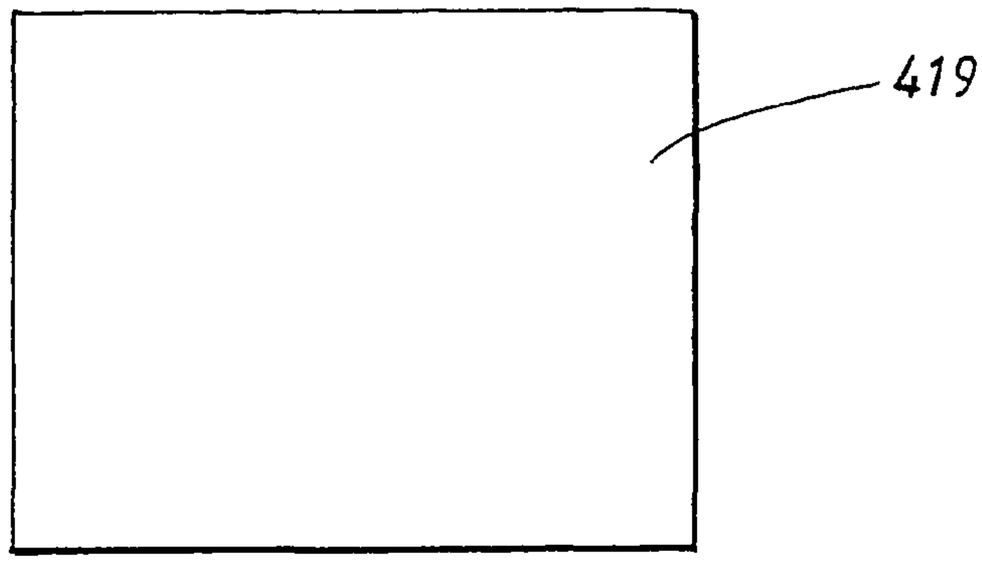

FIG.4a

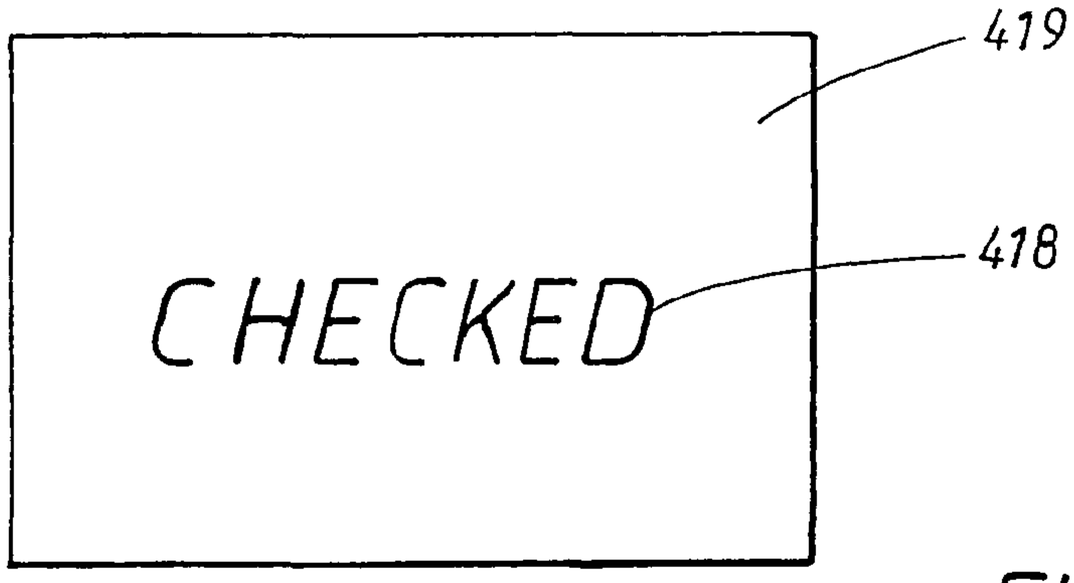

FIG.4b

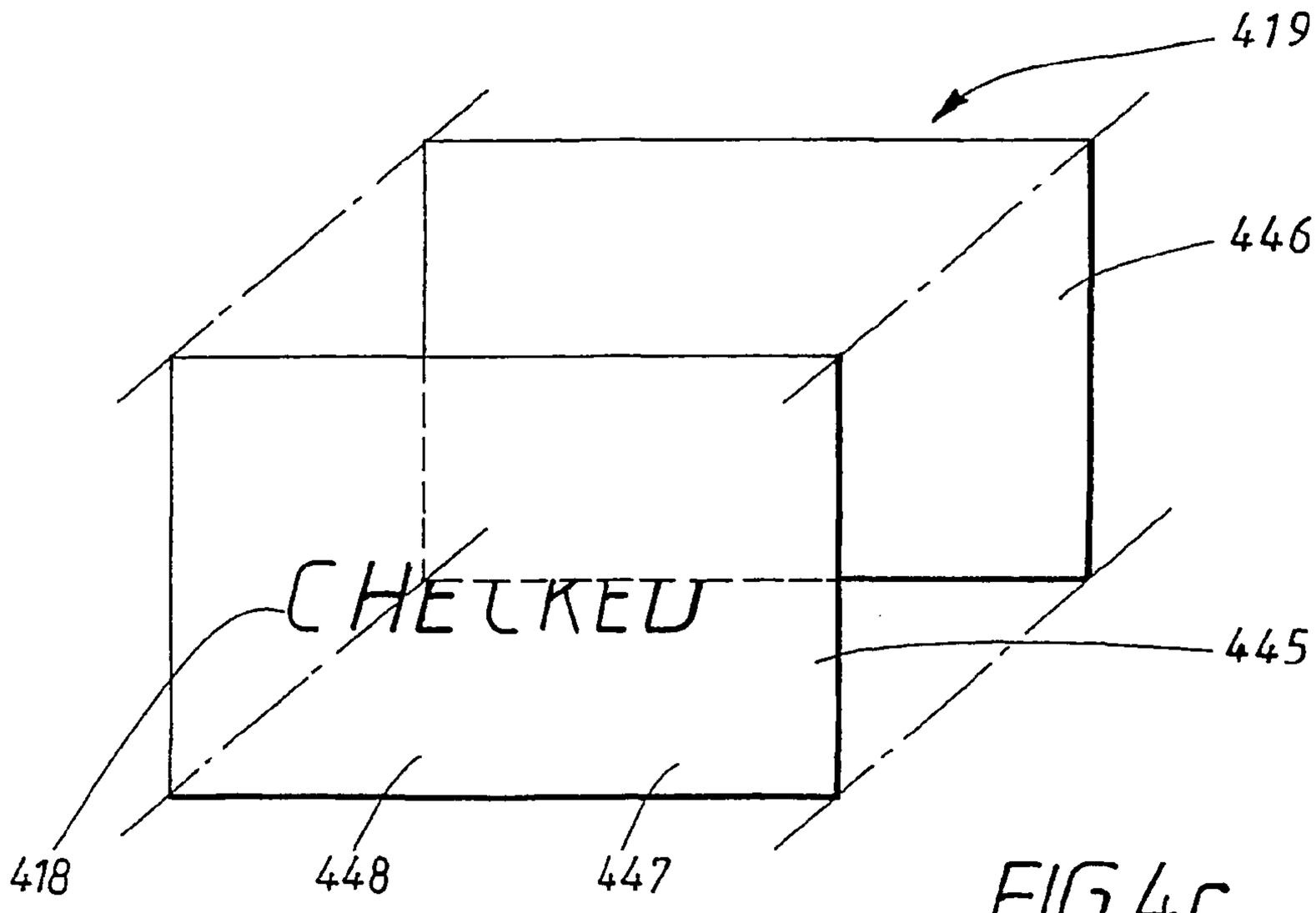

FIG.4c

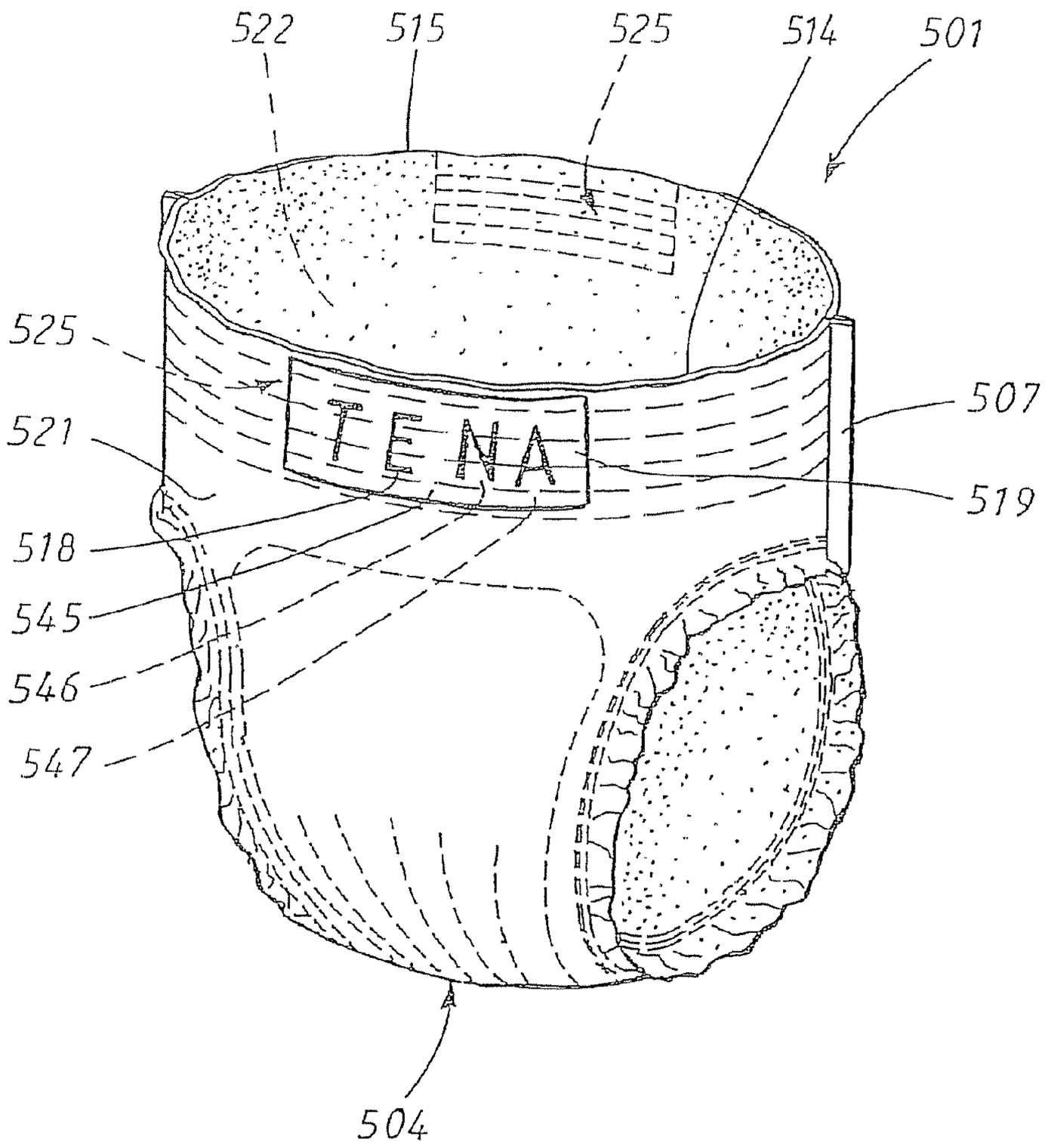

FIG.5

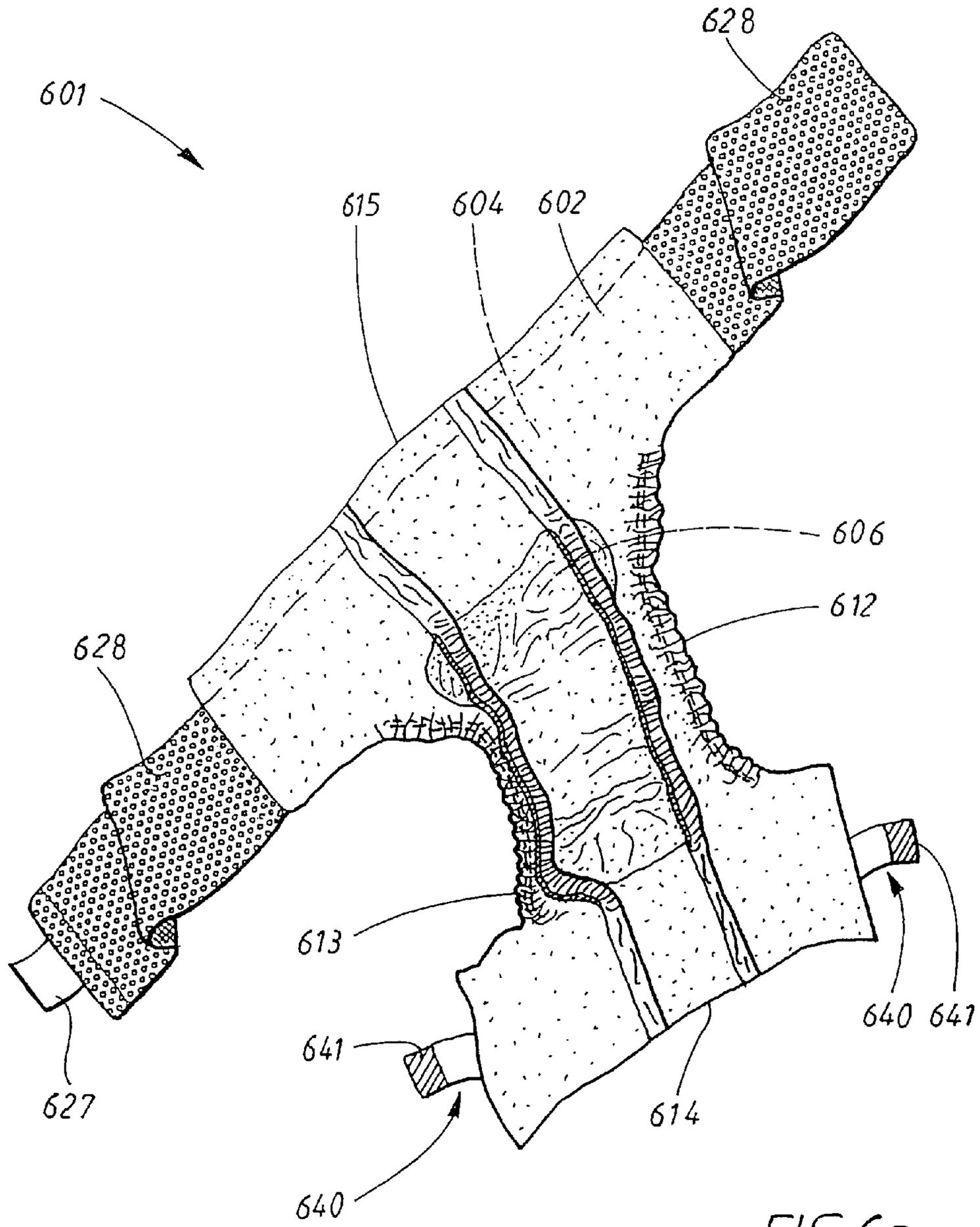

FIG.6a

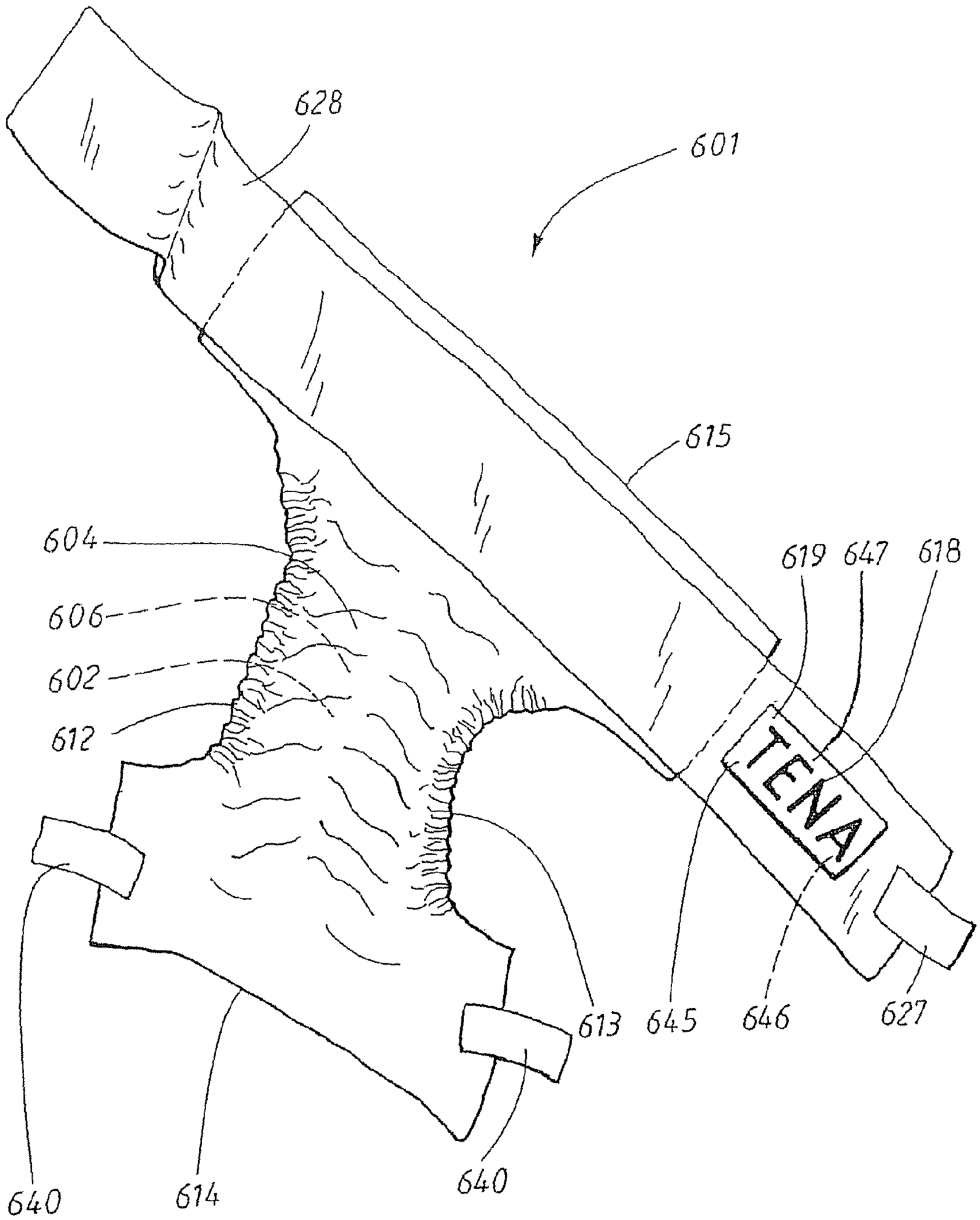
628
601
615
604
606
602
612
619
647
618
TENA
613
645
646
627
640
614
640

FIG.6b

ABSORBENT ARTICLE COMPRISING ONE OR SEVERAL PATTERNS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of PCT/SE2004/001918, filed on Dec. 20, 2004, and which designates the U.S. The entire contents of PCT/SE2004/001918 are incorporated herein by reference.

TECHNICAL FIELD

The invention relates to an absorbent article for disposable use comprising at least one pattern, in conjunction with which the pattern is superimposed on a background layer.

BACKGROUND

In the case of absorbent articles such as diapers, sanitary towels, incontinence protection, etc., the application of patterns in the form of texts, images, symbols or the like to certain layers included in the article is previously disclosed. Combinations comprising at least two of the pattern forms are also encountered. The texts and the symbols are preferably of an informative nature, for example in the form of a user instruction, a warning text or product information such as a size indication. The images are preferably in the form of decorative patterns, product information or user instructions. Patterns in the form of trademarks and/or company logotypes are also commonly encountered.

The pattern is usually arranged on one of the layers that forms the outside of the article when it is used, for example on the front or the rear end part of the article, on fastening tabs or on a side panel. It is especially common for the pattern to be arranged on the outside of the article on or close to the waist area of the article.

The pattern sometimes relates to instructions in respect of how the article must be applied to the wearer, the suitable article size for a certain body weight and the like.

Such patterns are commonly positioned together with other types of pattern such as a distinctive product mark, purely decorative patterns, positioning indicators for example for attachment flaps, indicators to show which end of the article must be positioned towards the front on the wearer, and so on.

The articles thus comprise different types of patterns, some intended to inform the user about handling the article, some simply intended to make the article more visually attractive, and some intended to warn of incorrect handling.

Certain patterns, intended to warn of incorrect handling which may be associated with a risk, such as a warning of the risk of suffocation if a child places a baby's diaper over its head, must naturally be capable of being read by a parent before the incorrect handling occurs.

Certain other patterns inform of less serious incorrect handling, such as information to the effect that the size of the article is incorrect in relation to the body size of the wearer, that the attachment flaps have been tightened too tightly around the wearer's waist or the like. This type of information does not need to be made visible until the incorrect use has taken place, in conjunction with which the incorrect use can be corrected directly or on the next occasion that an absorbent article is changed on the wearer, or even on the next occasion on which new absorbent articles are purchased.

Indicators for demonstrating the excessive stretching of a layer of material are described in PCT document WO 96/31175. The document describes a layer of material comprising a pattern consisting of curved lines when the layer of material is not stretched. The curved lines face in the intended direction of stretching. When the layer of material is stretched, the radii of curvature of the lines increase, in conjunction with which the initially curved lines become straighter, in conjunction with which the curvature of the lines gives an indication of by how much the layer of material has been stretched.

One disadvantage associated with the solution in WO 96/31175 is that the curved lines, regardless of whether or not overstretching has occurred, are always visible on the absorbent article. Patterns which are always visible on the absorbent article must naturally exhibit a certain degree of harmony with other patterns on the article, for which reason the warning signal cannot be executed sufficiently clearly and distinctly. A very clear and distinct warning signal runs the risk of dominating the pattern of the article in relation to other patterns that it is wished to emphasize on the article.

Another disadvantage is that the user must understand the symbols in the form of curved lines, and must also understand what it means when the curvature of the initially curved lines is changed and the level of change at which excessively high stretching of the layer of material has been reached.

If the layer of material is elastic, or if the layer of material is attached to an elastic layer of material, a third problem arises because the curvature of the curved lines essentially reverts to the original curvature when stretching of the layer of material ceases. This means that it is not possible to perform a verification in order, for example, to investigate whether the absorbent article has been tightened too tightly around the wearer's waist.

OBJECTS AND SUMMARY

Prior to the present invention, a need accordingly existed for an improved absorbent article, in which patterns intended to warn of minor errors in conjunction with the use of the absorbent article, such as the incorrect choice of article size, excessive tensioning around the waist, or the like, only become visible in conjunction with the incorrect use.

The need also existed for an improved absorbent article, in which the inspection of any errors can be read off both during and after use of the article.

The need existed, furthermore, for an improved absorbent article, in which the warning signal can be made more conspicuous.

Certain patterns are intended to be read and observed before use, in conjunction with which the patterns can comprise handling instructions, for example, which are only required in conjunction with putting the absorbent article on the wearer. Once the article has been put on the wearer, the presence of these patterns on the article is no longer either necessary or desirable.

Patterns of a certain type are, from the manufacturer's point of view, desirable to apply to the absorbent article, although they may be undesirable on the part of the wearer when the article is being worn. Examples of such patterns are trademarks for incontinence protection products, which the wearer does not wish to be visible through thin items of clothing, because these patterns reveal the wearer's incontinence problem.

In order to solve the problem of rendering a pattern invisible, the arrangement of the pattern on a separate layer that is detachably attached to the article is previously disclosed. A user looks at the pattern and reads the information before use, after which he/she removes the separate layer containing the pattern.

A product of this kind is described in US 2003/0088224 A1. Although the pattern is certainly removed by this process, the problem remains, namely that the removed layer has formed a separate residual product which must be dealt with. The wearer must then either find a suitable place to dispose of the layer or, in the absence of such a place, must keep the layer until such a place is found.

A need accordingly existed for an improved absorbent article, where the wearer can read a text or look at an image on the article before use, and where the text or the image is essentially rendered invisible when it is being worn.

An absorbent article of the kind mentioned in the introduction has been achieved, in conjunction with which the pattern essentially overcomes the problems referred to by way of introduction that have been associated with previous articles of this kind.

An absorbent article executed in accordance with the invention is characterized first and foremost in that at least one layer of material is arranged between the pattern and the background layer, in conjunction with which the intermediate layer or layers exhibits or exhibit a first, essentially transparent state, and in conjunction with which the intermediate layer or layers is or are transformed by elongation into a second, more opaque state.

In accordance with one embodiment of an absorbent article in accordance with the invention, the pattern and the background layer exhibit essentially the same shade of colour, in conjunction with which the pattern is essentially invisible against the background layer through the intermediate layer or layers when the intermediate layer or layers exhibits or exhibit the first, essentially transparent state, and in conjunction with which the pattern and the intermediate layer or layers exhibit an essentially different shade of colour when the intermediate layer or layers exhibits or exhibit the second, essentially opaque state, in conjunction with which the pattern is essentially visible against the intermediate layer or layers.

In accordance with another embodiment of an absorbent article in accordance with the invention, the pattern and the background layer exhibit essentially different shades of colour, in conjunction with which the pattern is essentially visible against the background layer through the intermediate layer or layers when the intermediate layer or layers exhibits or exhibit the first, essentially transparent state, and in conjunction with which the pattern and the intermediate layer or layers exhibit essentially the same shade of colour when the intermediate layer or layers exhibits or exhibit the second, essentially opaque state, in conjunction with which the pattern is essentially invisible against the intermediate layer or layers.

In accordance with one embodiment, the background layer consists of one or other of the liquid-permeable covering layer or backing layer of the article.

One embodiment of the invention is characterized in that the pattern is arranged directly on the intermediate layer, in conjunction with which the pattern is arranged on the side of the aforementioned intermediate layer that faces away from the background layer.

In accordance with one embodiment of an absorbent article in accordance with the invention, the pattern is arranged on a separate pattern layer, in conjunction with which the pattern layer is essentially transparent both before and after elongation.

In accordance with one embodiment, the intermediate layer or layers and the pattern layer are laminated together and constitute a prefabricated label.

In accordance with another embodiment, the prefabricated label contains a background layer.

In accordance with one embodiment, the intermediate layer or layers is or are attached to an elasticated surface of the article, in conjunction with which the intermediate layer or layers is or are elongated automatically when the surface to which the layer or layers is or are attached is elongated.

One embodiment relates to an absorbent article in which the intermediate layer or layers is or are arranged in the elasticated waist part of the absorbent article.

Another embodiment relates to an absorbent article in which the intermediate layer or layers is or are arranged on the elasticated belt of the absorbent article, in conjunction with which the intermediate layer or layers is or are elongated automatically when the belt is elongated.

In one embodiment, the intermediate layer or layers is or are arranged on at least one of the elasticated attachment flaps of the absorbent article, in conjunction with which the intermediate layer or layers is or are elongated automatically when the attachment flaps are elongated.

In accordance with one embodiment, the intermediate layer or layers contracts or contract when the surface on which the intermediate layer or layers is or are arranged contracts.

One embodiment relates to an absorbent article in which the intermediate layer or layers is or are intended to be elongated manually in order to cause the intermediate layer or layers to be changed from the first, essentially transparent state to the second, more opaque state.

In accordance with one embodiment, the intermediate layer or layers exhibits or exhibit a combined opacity of not more than 70.5% in accordance with the method described in ISO 2471:1988 when the intermediate layer or layers is or are in the first state.

In accordance with one embodiment, the intermediate layer or layers exhibits or exhibit a combined opacity of at least 76.2% in accordance with the method described in ISO 2471:1988 when the intermediate layer or layers has or have been transformed into the second state.

In accordance with one embodiment, changing the intermediate layer or layers from the first state to the second state is achieved by elongating the layer or layers of material by 10-200%.

In accordance with one embodiment, an absorbent article for disposable use comprises at least one pattern of a color, the pattern superimposed on a background layer having essentially a same shade of color as the at least one pattern, and at least one layer arranged over the background layer, the at least one layer exhibits a first, essentially transparent state in a first mode. The at least one layer is caused by elongation to be transformed into a second essentially opaque state in a second mode.

In accordance with one embodiment, an absorbent article for disposable use comprises at least one pattern of a color arranged on a surface of a pattern layer, the pattern layer including an intermediate layer and being superimposed on a background layer having a different shade of color than the color of the at least one pattern, the pattern layer exhibiting a first, essentially transparent state in a first mode in which a color of the pattern layer is different than the color of the at least one pattern. The pattern layer is caused by elongation to be transformed into a second state in a second mode in which the color of the pattern layer is essentially the same as the color of the at least one pattern.

In accordance with one embodiment, an absorbent article for disposable use comprises a top layer having a pattern of a color on it, a background layer of the same color as the

pattern, wherein the pattern is superimposed on the background layer, and optionally, a third layer arranged between the top layer and the background layer. At least one of the top and third layers exhibits a first, essentially transparent state in a first mode, and the at least one of the top and third layers is caused by elongation to be transformed into a second essentially opaque state in a second mode. The transformation of the at least one of the top and third layers affects the readability of the pattern.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described in more detail below with reference to the accompanying Figures.

FIG. **1***a* shows an open diaper in accordance with an embodiment of the invention from the side that is intended to face towards the wearer when it is being worn.

FIG. **1***b* shows the diaper in accordance with FIG. **1***a* before it has been worn, viewed from the side that is intended to face away from the wearer when it is being worn.

FIG. **1***c* shows the diaper in accordance with FIG. **1***b* after it has been worn and has been stretched too tightly around the wearer's waist, viewed from the side that is intended to face away from the wearer when it is being worn.

FIG. **2***a* shows a label constructed in accordance with an embodiment of the invention.

FIG. **2***b* shows the label in FIG. **2***a* after it has been stretched.

FIG. **2***c* shows an exploded view of the label in FIGS. **2***a* and **2***b*, in conjunction with which the different layers of material in the label are shown.

FIG. **3***a* shows a diaper comprising an alternative embodiment of the invention.

FIG. **3***b* shows the diaper in FIG. **3***a* after the label has been stretched manually.

FIG. **4***a* shows an alternative label in accordance with an embodiment of the invention.

FIG. **4***b* shows the label in FIG. **4***a* after it has been stretched.

FIG. **4***c* shows an exploded view of the label in FIGS. **4***a* and **4***b*, in conjunction with which the different layers of material in the label are shown.

FIG. **5** shows a pant diaper in accordance with an embodiment of the invention.

FIG. **6***a* shows a belt diaper in accordance with an embodiment of the invention from the side that is intended to face towards the wearer when it is being worn.

FIG. **6***b* shows the belt diaper in FIG. **6***a* from the side that is intended to face away from the wearer when it is being worn.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiment of the invention is an absorbent article for disposable use, which exhibits a pattern that emerges only after a certain event has taken place. An example of an event is that some part of the article was tensioned too tightly against the wearer when the article was put on, in conjunction with which the pattern comprises a warning in the form of an image, a symbol, a text or the like.

Another embodiment of the invention is an absorbent article for disposable use which exhibits a pattern, for example in the form of a text, image or symbol, which is visible to an observer on the outside of the article, and which, after a certain event, becomes less visible or even invisible. For example, a well-known trademark for incontinence diapers is rendered invisible, at least partially, when the article is put onto the wearer.

Absorbent articles include absorbent articles of the type such as all-in-one diapers, pant diapers, belt diapers or sanitary protection of the panty type, that is to say articles which enclose the wearer's abdomen when they are being worn. It is naturally also possible to apply the invention to less absorbent products such as sanitary towels, panty liners or light incontinence protection intended to be positioned in the crotch of a wearer. The design and positioning of these articles in a wearer's undergarments nevertheless means that the arrangement in accordance with the invention is probably less applicable for these types of absorbent articles.

All-in-one diapers, pant diapers or belt diapers may consist of baby's diapers intended for infants who are not yet potty trained, or of incontinence protection intended for adult incontinent wearers.

So-called pant diapers are characterized above all in that they have already been folded at the time of manufacture about an essentially transverse fold, line in the crotch area of the pant diaper and have subsequently been joined together at the waist. Diapers of this type are intended to be applied to a wearer like a pair of underpants, that is to say they are passed over the wearer's legs. The joint in the waist area of the pant diaper is usually capable of separation, in conjunction with which the pant diaper can be removed after use without having to be passed all the way down over the wearer's feet when it is to be removed. This possibility is particularly appreciated when the pant diaper is smeared with faeces after use.

Belt diapers are characterized in that they comprise a transverse belt in relation to the absorbent part of the diaper attached to either the front or the rear transverse edge of the diaper.

In conjunction with the application of a belt diaper of this kind, the belt is fixed in a first stage around the wearer's waist. The absorbent part of the diaper thus hangs loosely from the belt. The absorbent part of the diaper is then passed between the wearer's legs and is attached to the belt, in conjunction with which the belt includes fixing surfaces intended to adhere to fixing devices arranged on the absorbent part of the diaper adjacent to its free transverse edge.

So-called all-in-one diapers are characterized in that they include attachment flaps, by means of which the front and rear waist part of the diaper are attached when the diaper is applied around the waist of a wearer.

FIG. **1***a* shows essential components of a diaper **101** in accordance with an embodiment of the invention.

The diaper **101** is an open diaper of the so-called all-in-one type. The diaper **101** is not joined together in the waist area when it is sold, but is intended instead to be applied around a wearer's abdomen, in order thereafter to be joined together around the wearer's waist. This type of diaper **101** is commonly encountered for both infant and adult incontinent wearers.

The diaper **101** is essentially in the form of an hourglass and as such exhibits longitudinal edges **112**, **113**, a front transverse edge **114** and a rear transverse edge **115**. The diaper **101** also exhibits a front edge part **121**, a rear edge part **122** and a narrower crotch part **123** situated between the end parts **121**, **122**. The crotch part **123** is intended to be situated in the narrowest area between the wearer's thighs when it is being worn.

When wearing the diaper **101**, the front part of the crotch part **123** and the front end part **121** function principally as a

receiving area for urine, while the rear part of the crotch part **123** and the rear end part **122** function-principally as a receiving area for faeces.

The diaper **101** comprises a liquid-permeable covering layer **102** arranged over the surface of the diaper **101** that is intended to face towards the wearer when it is being worn, a backing layer **104** arranged over the surface of the diaper that is intended to face away from the wearer when it is being worn, an absorption body **106** enclosed between the liquid-permeable covering layer **102** and the backing layer **104**, and side flaps **103** arranged outside the absorption body **106**.

The liquid-permeable covering layer **102** of the diaper **101** extends outside the absorption body **106** around the periphery of the entire absorption body **106**. The liquid-permeable covering layer **102** can consist of any material that is suitable for the purpose. Examples of commonly encountered liquid-permeable covering materials are non-woven textile materials, known as nonwoven materials, perforated plastic films, meshes made of plastic or textile, and liquid-permeable foam layers. Liquid-permeable covering materials that are made of continuous thin fibres which extend predominantly in the longitudinal or transverse direction of the article are also encountered. Laminates consisting of two or more of the above-mentioned possible covering materials are also commonly encountered, as are coverings consisting of different materials in different parts of the surface.

A situation commonly encountered today is that the liquid-permeable covering layer **102** consists of a fully or partially elastic material in order to provide the diaper **101** with a better fit when it is being worn.

Diapers **101** containing absorption bodies **106** which exhibit especially high strength and resistance to wear may even function without the need to provide any extra liquid-permeable covering layer on that side of the diaper **101** that faces towards the wearer when it is being worn.

The backing layer **104** also extends beyond the absorption body **106** around the periphery of the entire absorption body **106**. Backing layers **104** that are normally present on diapers **101** are usually liquid-impermeable, although other types of backing layer are encountered. The backing layer **104** can consist of a range of different materials. The backing layer **104** most commonly consists of a thin liquid-impermeable plastic film, although it is also possible to use other types of liquid-impermeable material, such as nonwoven materials that have been made liquid-impermeable for example by means of plastic coating, liquid-impermeable foam layers, liquid-impermeable adhesive or similar. The backing layer **104** can also consist of a liquid-impermeable, vapour-permeable material. Also encountered are laminates containing at least one liquid-impermeable layer arranged against the absorption body **106**. These laminates usually consist of a liquid-impermeable material functioning as a moisture barrier and a more textile-like material arranged on the side of the diaper **101** that faces away from the wearer when it is being worn, as a consequence of which the outside of the diaper **101** more closely resembles an item of clothing when it is being worn. The textile-like layer of the laminate usually consists of a nonwoven layer, in conjunction with which the nonwoven layer can be executed so that it functions as a receiving material for a hook-and-loop material of the male type. A nonwoven material of this kind is characterized in that it comprises closed eyes, so-called loops, or the like.

The liquid-permeable covering layer **102** and the backing layer **104** are attached to one another outside the absorption body **106** along the entire periphery of the absorption body **106**.

The liquid-permeable covering layer **102** and the backing layer **104** may be attached to one another by a number of different means. Examples of means of attachment include gluing, thermal fusion, ultrasonic welding or the like.

Elastic devices **105** are arranged outside the absorption body **106** in those parts of the side flaps **103** of the diaper **101** which run essentially in the longitudinal direction of the diaper **101**. The elastic devices **105** function as leg elastic and have the task of preventing liquid and faeces from leaking out past the longitudinal edges **112**, **113** of the diaper **101**, and in this way they form outer moisture barriers **108** together with surrounding layers. The elastic devices **105** consist of one or more elastic threads that have been applied in their stretched state between the liquid-permeable covering layer **102** and the backing layer **104**, at least in the crotch part **123** of the diaper **101**. The elastic devices **105** are attached to the backing layer **104** and the covering layer **102** by gluing, ultrasonic welding or the like.

In alternative embodiments, the elastic devices can be arranged on the side of the side flaps **103** that is intended to face towards the wearer when it is being worn, or on the opposite side of the side flaps, and as such they are naturally only attached to the covering layer **102** and the backing layer **104** respectively.

The elastic devices can, in alternative embodiments, consist of elastic tape material, for example made of a foam material.

The hourglass-shaped absorption body **106** can be constructed from one or more layers of cellulose fluff pulp. The cellulose fluff pulp can be mixed for this purpose with fibres or particles of a high-absorbency polymer material of the kind which, in conjunction with absorption, chemically bonds large quantities of liquid to form a liquid-containing gel. The absorption body **106** can also contain high-absorbency polymer material arranged in a layer inside the absorption body or in conjunction with the surface or surfaces of the absorption body. Additional components to improve the characteristics of the absorption body **106** can also be present in the absorption body **106**. Examples of such components include binding fibres, different types of liquid-distributing layers or fibres, form-stabilizing components, reinforcing fibres or the like. The absorption body **106** can naturally also consist of other types of absorption material, such as absorbent nonwoven material, absorbent foam, textile materials, peat or mixtures of different kinds of absorption material.

Special layers with the ability rapidly to receive quite large quantities of liquid and to retain this liquid temporarily, in order subsequently to release the temporarily stored liquid to different parts of the absorption body **106**, can also be included in diapers of the prescribed kind. Such receiving layers are normally arranged for this purpose between the liquid-permeable covering layer **102** of the diaper **101** and the absorption body **106**. No receiving layer is shown in FIG. **1**.

In order further to prevent liquid or faeces from leaking out via the side edges **112**, **113** of the diaper **101**, the diaper **101** is provided with inner side leakage barriers **109** on the side that is intended to face towards the wearer when it is being worn. The inner side leakage barriers **109** are arranged adjacent to the longitudinal edges **110** of the absorption body **106** and extend essentially in the longitudinal direction of the diaper **101**. The respective inner side leakage barrier **109** is executed from a separate material strip **111**, which exhibits two essentially parallel longitudinal edges **116**, **117**. The material strip **111** is double-folded, in conjunction with which the longitudinal edges **116**, **117** of the material strip **111** are arranged adjacent to one another. The edges **116**, **117** of the material strip **111** are attached to the covering layer **102** and

constitute the attached edge of the inner side leakage barrier. The folded edge of the material strip **111** constitutes the free edge of the inner side leakage barrier **109**.

The inner side leakage barriers **109** are folded down and attached to the covering layer **102** on the front end part **121** and the rear end part **122** of the diaper **101**. The inner side leakage barriers **109** comprise elastic elements **124** attached to the inner side leakage barriers **109** in their pre-tensioned state. The elastic elements **124** are conveniently arranged adjacent to the free edges of the inner side leakage barriers **109**. When the pre-tensioned elastic elements **124** are released, they contract together with the free edges of the inner side leakage barriers **109**, thereby causing the inner side leakage barriers **109** to be brought into a raised configuration remote from the liquid-permeable covering layer **102**, at least, in the crotch part **123** of the diaper **101**, where the side leakage barriers **109** are not folded down and attached to the covering layer **102**.

The rear and/or front parts of the diaper **101** can also be provided with so-called waist elastic **125**, which consists of elastic devices arranged along the front transverse edge **114** and/or the rear transverse edge **115** of the diaper **101** in order to provide the diaper **101** with a soft and pliable closure around the wearer's waist. In the illustrative embodiment described here, only the rear end part **122** of the diaper **101** is provided with waist elastic **125**. In the example shown here, the waist elastic **125** consists of a thin strip of elastic foam material, which is attached by means of adhesive between the backing layer **104** and the liquid-permeable surface layer **102**. The waist elastic **125** is applied in its stretched state between the layers **102**, **104** in order to bring about a holding force which stretches the diaper **101** around the wearer's waist.

Two soft and inelastic attachment flaps **126** are arranged on the rear end part **122** for the purpose of securing the diaper **101** around a wearer. One attachment flap **126** is arranged for this purpose on each side part of the rear end part **122**. The attachment flaps **126** connect the rear end part **122** to the front end part **121** when it is being worn by the attachment flaps **126** exhibiting fixing devices **127**, which can be attached to a receiving part arranged on the front end part **121** of the diaper **101**. The attachment flaps **126** are appropriately executed from a very soft and inelastic material, for example from a single nonwoven layer or a laminate.

The attachment flaps may be elastic in alternative embodiments.

The fixing devices **127** preferably consist of male parts of a hook-and-loop material and are attached to the attachment flaps **126**, for example with adhesive, on the side of the attachment flaps **126** which faces towards the receiving part of the diaper **101** when it is being worn.

The receiving part, which is not shown in FIG. **1**, for the attachment flap **126** consists of a strip of a receiving material adapted for the fixing device **127** of the attachment flap **126**. The receiving part extends essentially parallel to the front transverse edge **114** of the side of the diaper that faces away from the wearer when it is being worn, that is to say on the side of the backing layer **104** that faces away from the absorption body **106**. In the illustrative embodiment described here, the material in the receiving part consists of a female part of a hook-and-loop material and is appropriately executed so that its extent in the longitudinal direction of the diaper **101** corresponds to the width **129** of the attachment flaps **126**. The receiving part extends substantially over the width of the entire diaper **101** in the transverse direction of the diaper **101**.

In alternative embodiments of a diaper, it is possible to consider the arrangement of separate receiving parts for the respective fixing devices **127**, in which case the receiving parts are arranged in conjunction with the longitudinal edges **112**, **113** of the diaper on the front transverse edge **114** of the diaper **101**.

When putting the diaper **101** on an infant, the diaper **101** is placed between the infant's legs in the infant's crotch. The diaper **101** is then closed around the infant's waist by causing the attachment flaps **126** to overlap the front end part **121** so that the fixing devices **127** of the attachment flaps **126** can be applied to the receiving part in order to hold the diaper in place.

The attachment flaps **126** are attached to the rear end part **122** in the attachment areas **130** that are positioned in the areas of the rear end part **122** which lie next to the lateral edges **112**, **113** running in the longitudinal direction. The attachment areas **130** consist of parts of the attachment flaps **126** and those parts of the rear end part **122** that are attached to one another.

The fixing devices **127** of the attachment flaps **126** in alternative embodiments can consist of a pressure-sensitive adhesive, in which case the receiving part (not shown in FIG. **1**) consists of a material to which the selected pressure-sensitive adhesive of the fixing devices **127** can be attached so as to achieve the appropriate joint strength. Combinations of materials are usually selected so that the attachment between the fixing devices **127** and the receiving part can be opened and reclosed to allow the diaper **101** to be checked while it is being worn.

In alternative embodiments, the backing layer **104** can be adapted in such a way as to interact with the fixing devices **127** of the attachment flaps **126**, in which case no special receiving part is required.

The diaper **101** is shown in FIG. **1***b* from the side that is intended to face away from the wearer when it is being worn, in conjunction with which the diaper **101** is shown before it was worn, or after having been worn by a wearer with a body size to which the diaper **101** is adapted.

The diaper **101** comprises a label **119** comprising three material layers. The three material layers consist of a transparent pattern layer **145** arranged outermost, furthest away from the diaper **101**, a background layer **146** arranged innermost, closest to the diaper **101**, and an intermediate layer **147** arranged between the pattern layer **145** and the background layer **146**. A pattern **118** is arranged on the transparent pattern layer **145**, in conjunction with which the pattern **118** is superimposed on the intermediate layer **147** and the background layer **146**.

The diaper **101** is characterized first and foremost in that the intermediate layer **147** of the label **119** is essentially transparent in a first state, in conjunction with which the pattern **118** is essentially invisible against the background layer **146** through the transparent intermediate layer **147**, because the background layer **146** and the pattern **118** exhibit essentially the same shade of colour. When the intermediate layer **147** is subjected to elongation, the intermediate layer **147** is transformed into a second, essentially less transparent state, in conjunction with which the pattern **118** stands out against the intermediate layer **147**.

When the diaper **101** is put on a wearer, the diaper **101** is stretched around the wearer's waist when the attachment flaps **126** of the diaper **101** are attached to the front edge part **121** of the diaper **101**. The waist elastic **125** of the diaper **101** is stretched out in conjunction with this from its initially contracted state, in conjunction with which the label **119** is elongated together with the waist elastic **125**.

If the intermediate layer **147** of the label **119** is elongated too much in conjunction with putting the diaper **101** on a wearer, the intermediate layer **147** will be transformed into its

second state, in conjunction with which the second state exhibits essentially less transparency compared with the first, non-elongated state. The background layer **146** is thus essentially concealed by the intermediate layer **147**, in conjunction with which the intermediate layer **147** provides a new background for the pattern **118**.

The result is that the pattern **118** becomes visible against the intermediate layer **147**, which does not exhibit the same shade of colour as the shade of colour of the pattern **118**.

If the diaper **101** is of the right size and is not tensioned too tightly around the wearer's waist, the intermediate layer **147** of the label **119** will remain transparent, in conjunction with which the pattern **118** will not be visible either during or after wearing of the diaper **101**.

FIG. **1***c* shows a diaper **101** from the side that is intended to face away from the wearer when it is being worn, in conjunction with which the diaper **101** is shown after it has been worn and the diaper **101** has been stretched too tightly around the wearer's waist.

The diaper **101** may have been stretched too tightly around the wearer's waist for a number of different reasons, although one of the most common reasons is that the diaper **101** is too small in relation to the wearer (the infant or the incontinent patient). Another commonly encountered reason is that the person who carried out the diaper change (the care staff or the parent) tensioned the diaper **101** too tightly around the waist in the belief that this may reduce the risk of leakage or urine or faeces from the diaper **101**.

A pattern **118** in the form of the words "OVER STRETCHED" can now be read on the label **119**, because the intermediate layer **147** has been transformed into its second, essentially opaque state, in conjunction with which a colour contrast in relation to the pattern **118** has been achieved in conjunction with putting on the diaper.

The pattern **118** provides a warning message to the carer/parent and informs them if the diaper has been stretched unnecessarily tightly around the wearer's waist.

The pattern **118** can, in alternative embodiments, consist of an alternative warning text, a warning message in the form of an illustrative figure, symbol or the like. For example, information about the desirability of obtaining a larger size of diaper **101** may be revealed when the diaper **101** has been over stretched in the waist area.

The pattern **118** can, in other alternative embodiments, comprise a combination of images, text and symbols.

The label **119** is discreetly executed and exhibits no visible pattern before use or after correct use on a wearer with a body size to which the diaper **101** is adapted.

The label **119** exhibits a rectangular form and is arranged in conjunction with the rear transverse edge **115** of the diaper **101** with its long sides parallel to the rear transverse edge **115**. Both end areas **120** of the label **119** are attached to the backing layer **104** of the diaper **101** by means of ultrasonic welding, although in alternative embodiments they can be attached by means of gluing, thermal welding or the like.

The means by which the label **119** has been attached to the diaper **101** is not critical for the invention, although it is important to avoid a method of attachment which physically influences the label **119** in such a way that the intermediate layer **147** is caused to be transformed fully or partially from its first state to its second state by handling during attachment to the backing layer **104** of the diaper **101**.

It is also important for the label **119** to be attached to the diaper **101** in such a way that it is possible to stretch it sufficiently for the intermediate layer **147** to be capable of being transformed from its first, essentially transparent state into its second, at least partially opaque state. The intermediate layer **147** must, therefore, at the time when it is applied to the diaper **101**, be in its first, essentially transparent state and must remain so, at least until the diaper **101** is to be put on a wearer.

The label **119** with its associated pattern **118** is arranged, in the embodiment described here, on the rear transverse edge **115** of the diaper **101** adjacent to the waist elastic **125**.

In alternative embodiments, the label **119** comprising the pattern **118**, which will become visible in the event of excessively high contact force against the wearer's body, can be positioned in some other elasticated zone of the diaper **101**. Suitable positions include areas of the diaper **101** that are stretched automatically in connection with wearing the diaper.

Examples of alternative positions include on the front side panels **131** or the rear side panels **132** of the diaper **101** in those cases in which these exhibit elastic characteristics.

Another conceivable position is on the attachment tabs **126** of the diaper **101**, in those cases in which these are elastic.

It is naturally also possible for the label **119** containing the pattern **118** to be positioned on the front end part **121** of the diaper adjacent to the front transverse edge **114** of the diaper **101**, if the diaper **101** exhibits elastic characteristics at the front transverse edge **114**.

Excessive tightening of the diaper **101** against the wearer's groin is a common occurrence. In order to indicate such excessively tight tensioning, it is appropriate to arrange labels **119** in accordance with the invention adjacent to the elastic devices **105** on the side flaps **103** of the diaper **101** and/or on the inner side leakage barriers **109** adjacent to the elastic elements **124**. These labels **119** are difficult/impossible to inspect while the diaper is being worn, and inspection must accordingly be performed in conjunction with changing the diaper **101**.

In order to prevent the label **119** that is arranged on the waist elastic **125** of the diaper **101** from becoming loose and baggy if the waist elastic **125** contracts after the initial elongation in conjunction with putting on the diaper **101**, it is preferable to design the label **119** with elastic characteristics. It is possible, for example, to cause at least one of the layers **145**, **146**, **147** to be executed from an elastic material and to laminate the layers **145**, **146**, **147** together, in which case the label **119** will have elastic characteristics.

In an alternative embodiment, the layers **145**, **146**, **147** of the label **119** can be laminated together with the backing layer **104** over the waist elastic **125**, in conjunction with which the label **119** is able to contract together with the waist elastic **125**.

The intermediate layer **147** of the label **119** consists of a plastic film which is transformed from being transparent to become white and at least partially opaque when it is subjected to visco-elastic elongation.

It is a well-known fact that certain plastic materials change colour and become white when they are subjected to visco-elastic elongation.

The transition of the intermediate layer **147** from its first, essentially transparent state to its second, at least partially opaque state is irreversible and is caused by plastic deformation of the intermediate layer **147**. The change in opacity is brought about by the formation of micro pores or cavities in the intermediate layer **147** when it undergoes plastic deformation, such as stretching, as a consequence of the presence in the intermediate layer **147** of fillers in the form of solid particles which are not elongated with the rest of the material. These micro pores or cavities mean that the light is refracted and that a large proportion of the incident light is reflected instead of passing through the layer. Alternatively, it is also

conceivable to provide the intermediate layer **147** with micro ampoules containing a pigment. The micro ampoules will be caused to rupture by elongating the material, and the pigment will stain the layer.

It is naturally not necessary for the invention to consist of a label **119** in accordance with the above description. In alternative embodiments, for example, the layers **145**, **146**, **147** can be arranged as separate layers one on top of the other on the diaper **101**.

It is also possible to imagine the possibility that two of the three layers **145**, **146**, **147** are joined together before they are applied to the diaper **101**. For example, the background layer **146** and the intermediate layer **147** can constitute a combined first component that is attached to the diaper **101** in a first stage, after which the pattern layer **145** containing the pattern **118** is arranged on top of this first component.

Described in U.S. Pat. No. 5,190,812 is a film material that may conceivably be used for the intermediate layer **147** of the label **119**. The film material exhibits the characteristic that it is transformed from an essentially transparent state into an essentially opaque state by stretching. The film material also exhibits elastic characteristics, in which case it does not need to be laminated together with any transparent elastic film material before being used in the diaper **101** in accordance with the invention. The film is formed from fibres and consists of one or more elastic layers and one or more layers of non-elastic material.

Heat and pressure under controlled forms are used in accordance with the patent to produce a transparent film that is transformed into an opaque state when it is stretched. The elastic components in the film material exhibit residual elongation not exceeding 20% following elongation by circa 300%-500%.

The opacity is brought about when the non-elastic components of the film material are subjected to plastic deformation during elongation, in conjunction with which the difference in opacity can already be noted after elongation by approximately 5%. These characteristics can be influenced by varying the constituent components in the film material and its thickness. The patent describes suitable components and manufacturing methods for a film material that is suitable for the invention.

Depending on the position of the label **119** on the diaper **101**, the intermediate layer **147** of the label **119** must be transformed from its first, essentially transparent state to its second, more opaque state for different elongations, because different parts of the body exhibit different sensitivity to contact pressure. For example, tightening of/contact by the diaper **101** around the waist is less sensitive than excessively tight contact of the inner side leakage barriers **109** with the wearer's groin area. The indication of precise values for the point at which the intermediate layer **147** of the label **119** must be transformed from its first state to its second state must be arrived at by a process of trial and error, because the degree of stretching, in addition to the point on the wearer's abdomen at which contact is produced, will depend on the stretching force exhibited by the elastic element.

U.S. Pat. No. 5,200,247 presents an alternative film material that is transformed from being essentially transparent in its basic state to being essentially opaque when it is stretched. The described film material consists of a mixture of polycaprolacton (PCL) and polyvinyl alcohol (PVA). Films that are produced exclusively with one or other component in the mixture are not opaque when stretched, but in the case of a mixture of the materials, the resulting film material becomes essentially opaque when it is stretched.

Examples 1 and 4 in U.S. Pat. No. 5,200,247 describe functional mixtures. FIG. **5** in the same Patent shows how the materials produced in accordance with example 4 reduce the light transmission capacity for an increase in length of 200% (from 6 inches to 18 inches), which increase in length has been achieved by a varying rate of elongation. At a rate of elongation of circa 5 mm/sec, the light transmission capacity of the material is already reduced from circa 85% to circa 20% for one material in the elongation in question. The change in the light transmission capacity of the film material takes place as a consequence of the formation of micro pores and micro cavities when the material is stretched, in conjunction with which the pores/cavities trap the light that would otherwise have passed through. Although the process described in U.S. Pat. No. 5,200,247 relates mainly to the stretching of the layer of material in order to make it opaque before it is applied, for example to an absorbent article, it is obvious that it can be applied in a non-stretched transparent state in view of the statement that the material can be stretched at room temperature in order to cause it to become opaque.

Reference is made to U.S. Pat. No. 5,200,247 in its entirety for a more detailed description of the manufacturing process in its entirety and the components contained in the film. U.S. Pat. No. 5,200,247 is incorporated herein by reference.

A suitable, commercially available film material is marketed by the ACE RKW Film Division in Liege, Belgium, under the product name CODE 728.

Although a description of a few conceivable materials that are suitable for inclusion in the intermediate layer **147** of the label **119** in a diaper **101** in accordance with the invention is given above, a person skilled in the art will readily appreciate that these materials can be replaced by other materials exhibiting the same effect. The essential nature of the invention is such that the characteristics of the material must satisfy the requirement that it is essentially transparent in its first state, and that the material in a second state, after it has been elongated to a sufficient extent, is at least partially opaque, so that the background layer **146** of the label **119** is essentially concealed, in conjunction with which the pattern becomes visible. The choice of material itself is not of critical significance as long as it cannot be regarded as being injurious to the health or, when other similar factors are taken into consideration, its use in a diaper **101** or some other absorbent article is undesirable.

The opacity value of a layer of material is a measure of the ability of the layer of material visually to conceal, for example, a subjacent text through the layer of material, or, as in the case of the embodiment described here, to conceal the background layer **146** so that the pattern **118** becomes visible.

The opacity is measured as a percentage value, where an opacity of 100% indicates that nothing can be seen through the layer of material, and 0% indicates that the layer of material is fully transparent.

The principle of an opacity measurement involves measuring the light reflectance factor (R_0) through a layer of material against a standardized black background, and the intrinsic reflectance factor ($R\infty$) against a bundle of layers of material, in which case the bundle of layers of material is entirely opaque. The opacity is determined according to the formula $100 \times R_0/R\infty$.

The measurements were performed in accordance with the ISO 2471:1998 method, which is originally a method intended for measuring the opacity of white or almost white sheets of paper. However, the method also functions for those types of material that are suitable in the present invention.

The measurements were carried out using a Color Touch 2, model ISO, from Technidyne in the USA, in conjunction with

which calibrations were performed in accordance with the manual supplied with the apparatus.

The measured opacity values consist of the mean values for five measurements.

The opacity of the CODE 728 film material from ACE RKW Film Division (Liege, Belgium) was measured in its first, non-stretched state, in conjunction with which the layer of material exhibited an opacity of 48.1%.

The film material was applied as an intermediate layer **147** to the label **119**, in conjunction with which the background layer **146** of the label **119** was clearly visible through the intermediate layer **147**. Because the pattern **118** that is arranged on the transparent pattern layer **145** exhibits the same shade of colour as the background layer **146**, the pattern **118** is essentially invisible when the intermediate layer **147** is in its first state.

The same film material, when stretched by circa 200%, that is to say when it has been transformed into its second state, exhibited an opacity of 76.2%. At this opacity of the intermediate layer **147**, the background layer **146** was concealed, in conjunction with which the pattern **118** was visible relatively clearly against the intermediate layer **147**.

Stretching of the film material by circa 200% meant that the thickness of the material layer was reduced from 70 μm before stretching to 25 μm after stretching.

In a second measurement, two intermediate layers **147** of the same film material from ACE Film Division were placed one on top of the other, after which the opacity of the double layers was measured. The layers exhibited an opacity of 70.5% in their first state, in conjunction with which the background layer **146** could be seen clearly through the intermediate layer **147**, and in conjunction with which the pattern **118** was essentially invisible.

In their second, stretched state, the intermediate layers **147** exhibited a combined opacity of 89.1%. For the purposes of this second measurement, too, the layers were stretched by circa 200% when they were in their second state. The pattern **118** was now very clear because the background layer **146** was very effectively concealed by the two intermediate layers **147**.

FIG. **2***a* shows a label **219** of the type described in the illustrative embodiment in accordance with FIGS. **1***b* and **1***c* above before the label **219** had been stretched.

FIG. **2***b* shows the label **219** in FIG. **2***a* after stretching of the label **219**.

FIG. **2***c* shows an exploded view of the construction of the label **219** consisting of three layers and a pattern in the form of the warning text "OVER STRETCHED".

The designations used in FIGS. **2***a*, **2***b* and **2***c*, which have a corresponding designation in FIGS. **1***a*, **1***b* and **1***c*, have the same designation digit in the numerical series **200-299** as the corresponding designation in the numerical series **100-199** in FIGS. **1***a*, **1***b* and **1***c*. For example, the pattern layer has the designation **145** in FIGS. **1***b* and **1***c*, and the designation **245** in FIG. **2***c*.

The label **219** comprises a pattern layer **245**, in conjunction with which a pattern **218** in the form of the warning text "OVER STRETCHED" is arranged by means of printing on the pattern layer **245**.

The label **219** also comprises a coloured background layer **246**, in conjunction with which the shade of colour of the background layer **246** harmonizes with the shade of colour of the printed pattern **218**. The pattern **218** and the pattern layer **245** are superimposed on the background layer **246**.

A third layer, the so-called intermediate layer **247**, is arranged between the pattern layer **245** and the background layer **246**. The intermediate layer **247** is characterized primarily in that it can exhibit two different states, a first, essentially transparent state and a second, at least partially opaque state, in conjunction with which the second state is obtained after stretching the label **219** comprising the intermediate layer **247**.

The intermediate layer **247** is shown in FIGS. **2***a* and **2***c* in its first, essentially transparent state, in conjunction with which the text "OVER STRETCHED" is not visible due to the fact that the background layer **246** exhibits the same shade of colour as the shade of colour of the pattern **218**.

In the exploded view shown in FIG. **2***c*, it can be seen that only the letter "O" in the word "OVER" is visible, due to the fact that the letters "VER" are present in front of the background layer **246** in the exploded view.

In FIG. **2***b*, the label **219** has been subjected to elongation, in conjunction with which the intermediate layer **247** has been transformed into its second, essentially more opaque state, so that the pattern **218** in the form of the printed warning text "OVER STRETCHED" has become visible.

The pattern layer **245**, the background layer **246** and the intermediate layer **247** all have the same length and width and are arranged so that their edges coincide.

In alternative embodiments, it is possible to imagine that the three layers, **245**, **246**, **247** have different sizes, but it is important for the intermediate layer **247** to cover the entire pattern **218** so that the entire pattern appears after stretching the label.

In other alternative embodiments, it is possible to imagine that the background layer **246** consists of the liquid-impermeable backing layer of the absorbent article, or of its liquid-permeable covering layer, in conjunction with which the shade of colour of the pattern **218** must be adapted in accordance with the layer that constitutes the background layer.

The intermediate layer **247** exhibits its first, essentially transparent state when the label **219** is applied to an absorbent article, in conjunction with which the pattern **218** is not visible against the background layer **246**, since the pattern **218** and the background layer **246** exhibit the same shade of colour, and since the intermediate layer **247** is essentially transparent.

When the label **219** is elongated, the intermediate layer **247** is transformed into its second, at least partially opaque state, in conjunction with which the pattern **218** becomes visible against the at least partially opaque intermediate layer **247** which conceals the background layer **246**.

The pattern layer **245**, the intermediate layer **247** and the background layer **246** are laminated together and together form the label **219**.

On the side of the background layer **246** that is intended to face towards an absorbent article, the background layer **246** is already coated with a pressure-sensitive adhesive in conjunction with manufacture of the labels, in which case the labels **219** can be applied directly to absorbent articles without requiring the application of any extra adhesive.

In alternative embodiments, the labels **219** can be supplied to the production machine for absorbent articles without being coated with adhesive, in which case the labels **219** must be coated with adhesive in conjunction with their application to the absorbent articles.

The labels **219** are usually supplied in roll form, in which case individual labels **219** are separated from the roll in conjunction with their application to the absorbent articles.

FIGS. **3***a* and **3***b* show a diaper **301** in accordance with an alternative embodiment of the invention. The diaper **301** is shown in FIGS. **3***a* and **3***b* from the side which, when it is being worn, is intended to face away from the wearer.

The designations used in FIGS. **3***a* and **3***c*, which have a corresponding designation in one or other of the preceding figures, have the same designation digit in the numerical series **300-399** as the corresponding designation in the lower numerical series in earlier figures. For example, the pattern layer has the designation **145** in FIGS. **1***b* and **1***c*, and the designation **345** in FIG. **3**.

The diaper **301** is constructed essentially in the same way as the diaper **101** in FIGS. **1***a*, **1***b* and **1***c*. The diaper **301** is primarily a so-called incontinence diaper intended for adult incontinent wearers, in conjunction with which it is used, for example, in the care of patients on a hospital ward or in a home for the elderly. The provision of such care by its nature involves a number of carers in the care of each individual patient, in conjunction with which a lack of clarity often easily arises in respect of what measures have been taken for a particular patient.

The diaper **301** exhibits a label **319** comprising two layers of material. The two layers of material consist of a background layer **346** arranged closest to the backing layer **304** of the diaper **301**, and a pattern layer **345** arranged on the surface of the background layer **346** facing away from the diaper **301**.

A pattern **318** is arranged on the pattern layer **345** on the side of the pattern layer **345** that faces away from the diaper **301**.

The diaper **301** is characterized first and foremost in that the pattern layer **345** of the label **319** is essentially transparent in a first state and is transformed into an essentially more opaque state when it is elongated.

In this embodiment, the pattern layer **345** of the diaper **301** thus also constitutes the intermediate layer **347** of the diaper **301**, in conjunction with which the pattern **318** is arranged on the surface of the pattern layer **345** that faces away from the background layer **346**.

The pattern **318** exhibits essentially the same shade of colour as the background layer **346**, in conjunction with which the pattern **318** is essentially invisible against the background layer **346** through the pattern layer **345** when this is in its first, essentially transparent state.

When the label **319** is stretched out, the pattern layer **345** is transformed into its second, essentially opaque state, in conjunction with which the pattern **318**, which is arranged on the surface of the pattern layer **345** that faces away from the background layer **346**, becomes visible.

The pattern **318** consists of the text "CHECKED". The label **319** containing the pattern **318** is arranged in an area of the backing layer **304** that does not exhibit any elastic characteristics.

The label **319** exhibits essentially square form, in conjunction with which two of the edges of the label **319** are arranged essentially parallel to the front transverse edge **314** of the diaper **301**.

The label **319** is attached to the backing layer **304** of the diaper **301** along one of the edges of the label **319** that is arranged perpendicular to the front transverse edge **314** of the diaper **301** by means of a permanent ultrasonically welded connection **337**.

A separable glued joint **338** connects the opposite edge of the label **319** to a surface **339** that has been treated with a release agent arranged on the backing layer **304**.

The glue in the glued joint **338** preferably consists of a pressure-sensitive hot-melt adhesive.

The surface **339** that has been treated with a release agent consists of a siliconized surface arranged on the backing layer **304**.

In alternative embodiments, the surface **339** that has been treated with a release agent may consist of a separate piece of material that has been attached to the backing layer **304** of the diaper **301**. The piece of material in this case may consist of a sheet of paper siliconized on one side, a waxed paper, an embossed plastic film or the like.

When wearing the diaper **301**, it is possible to make the pattern **318** appear manually by separating the separable glued joint **338** in one simple operation and by then elongating the label **319** in the transverse direction of the diaper **301** to such an extent that the pattern layer **345** is transformed into its second, essentially less transparent state. After elongation, the glued joint **338** is again attached to the backing layer **304** of the diaper **301** by means of the pressure-sensitive adhesive. Because the newly created glued joint will not be opened on any subsequent occasion, it is appropriate for the reclosure of the glued joint to be arranged against a surface on the backing layer **304** that has not been treated with a release agent. The diaper **301** with a stretched and resealed label **319** is shown in FIG. **3***b*, in conjunction with which the pattern **318** is visible.

Diapers **301** containing labels **319** in accordance with this embodiment are, as mentioned above, particularly suitable for use in institutional care, where a number of different carers care for one and the same patient. By stretching out the label **319** so that the pattern **318** is visible, it is possible to indicate to subsequent carers that the diaper **301** has been checked in respect of the content of urine therein, for example. It is naturally also possible to show alternative indications of other measures that have been performed for the patient by means of a label **319** in accordance with the above description.

The label **319** in accordance with the embodiment shown in FIGS. **3***a* and **3***b* does not need to be elastic, because it is not intended to interact with any elastic element on the diaper **301**, although there is naturally no disadvantage if the label **319** exhibits elastic characteristics.

FIG. **4***a* shows a label **419** of the type described in the illustrative embodiment in accordance with FIGS. **3***a* and **3***b* above before the label **419** was stretched out.

FIG. **4***b* shows the label **419** in FIG. **4***a* after stretching.

FIG. **4***c* shows an exploded view of the construction of the label **419** comprising two layers and a pattern in the form of the text "CHECKED".

The designations used in FIGS. **4***a*, **4***b* and **4***c*, which have a corresponding designation in one or other of the preceding figures, have the same designation digit in the numerical series **400-499** as the corresponding designation in the lower numerical series in earlier figures.

The label **419** comprises a pattern layer **445**, which at the same time constitutes the intermediate layer **447** of the label **419**, as well as a background layer **446**. A pattern **418** in the form of the text "CHECKED" is arranged by means of printing on the pattern layer **445** that faces away from the background layer **446**, that is to say on the outward-facing surface **448** of the pattern layer **445**.

The shade of colour of the background layer **446** harmonizes with the shade of colour of the superimposed printed pattern **418**.

The pattern layer **245** is characterized first and foremost in that it is capable of exhibiting two different states, a first, essentially transparent state and a second, at least partially opaque state, in conjunction with which the second state is obtained after stretching the label **419** containing the pattern layer **445**.

The pattern layer **445** is shown in FIGS. **4***a* and **4***c* in its first essentially transparent state, in conjunction with which the text "CHECKED" is not visible due to the fact that the background layer **446** exhibits the same shade of colour as the shade of colour of the pattern **418**.

In the exploded view shown in FIG. **4***c*, the letters "CH" are fully visible, while only the bottom half of the letters "ECKED" in the word "CHECKED" are visible. The reason why the top half of the letters "ECKED" are not visible is that they are present in front of the background layer **446**, which exhibits the same shade of colour as the shade of colour of the letters, and that the pattern layer **445** is transparent in its first state.

In FIG. **4***b*, the label **419** has been subjected to elongation, in conjunction with which the pattern layer **445** has been transformed into its second, essentially more opaque state, so that the pattern **418** in the form of the printed text "CHECKED" has become visible.

The pattern layer **445** and the background layer **446** are rectangular, in conjunction with which both layers **445**, **446** exhibit the same length and width and are arranged so that their edges coincide.

In alternative embodiments, it is possible to imagine that the label **419** exhibits an alternative form, for example circular form, oval form or the like.

In other alternative embodiments, it is possible to imagine that the background layer **446** consists of the liquid-impermeable backing layer of the absorbent article, or of its liquid-permeable covering layer, in conjunction with which the shade of colour of the pattern **418** must be adapted in accordance with the layer that forms the background layer.

The pattern layer **445** exhibits its first, essentially transparent state when the label **419** is applied to an absorbent article, in conjunction with which the pattern **418** is not visible against the background layer **446**, since the pattern **418** and the background layer **446** exhibit the same shade of colour, and since the pattern layer **445** is essentially transparent.

When the label **419** is elongated, the pattern layer **445** is transformed into its second, at least partially opaque state, in conjunction with which the pattern **418** becomes visible because a new shade of background colour has been created in the form of the essentially more opaque intermediate layer **447**.

The pattern layer **445** and the background layer **446** are laminated together and together constitute the label **419**. This label **419**, too, can naturally comprise a pressure-sensitive adhesive on the side which, in conjunction with application, is intended to be attached to an absorbent article, although it can alternatively be supplied without pressure-sensitive adhesive.

FIG. **5** shows a pant diaper **501** intended primarily for incontinent adult users. The designations used in FIG. **5**, which have a corresponding designation in one or other of the preceding figures, have the same designation digit in the numerical series **500-599** as the corresponding designation in the lower numerical series in earlier figures. The pant diaper **501**, which is shown from the front in a configuration resembling that when it is being worn, is constructed largely in the same way as the open diaper **101** in FIG. **1**. The pant diaper **501** differs primarily from the open diaper **101** in FIG. **1** in that the pant diaper **501** is intended to be put on a wearer in the same way as a pair of underpants, that is to say to be passed over the legs. The front end part **521** and the rear end part **522** of the pant diaper **501** have already been connected together in this case in the waist area of the pant diaper **501** during manufacture, in conjunction with which the pant diaper **501** has been given the form of panties.

The waist connection **507** consists of an ultrasonic weld, but in alternative embodiments it can consist of a glued joint, a thermally welded joint, a sewn joint or the like.

It is customary today for pant diapers **501** to be capable of being opened and reclosed, in conjunction with which the connection **507** between the end parts **521**, **522** of the pant diaper **501** can be opened to permit inspection of the pant diaper **501** when it is being worn and can then be reclosed so that it can continue to be worn. It is usual in this case for the pant diaper **501** to have been provided with attachment flaps (not shown in the figure), which can be used for reclosing after the prefabricated connection **507** has been separated and rendered unserviceable.

Pant diapers **501** that are capable of being opened, or separated, are also advantageous when the pant diaper **501** must be removed from a wearer after use, in particular if the pant diaper **501** is smeared with faeces. The waist connection **507** of the pant diaper **501** can be separated in this case when it is to be removed from a wearer, so that the contaminated pant diaper **501** does not need to be passed over the wearer's legs and feet during removal.

As far as the positioning of patterns on the pant diaper **501** is concerned, they are usually positioned in appropriate locations corresponding to those indicated for the open diaper **101** in FIG. **1**.

Patterns may conceivably be present on the backing layer **504** adjacent to the front transverse edge **514** of the pant diaper **501** and/or adjacent to the rear transverse edge **515** of the pant diaper **501**, which form the waist of the pant diaper **501** and where the waist elastic **525** is arranged. It is also conceivable to position patterns in alternative locations on the front and/or rear end part **521**, **522** of the pant diaper **501**.

The pant diaper **501** is characterized in that it comprises a label **519** comprising a pattern **518** functioning in accordance with the invention. The label **519** is arranged on the waist elastic **525** on the front end part **521** of the pant diaper **501**.

The label **519** comprises three material layers. The three material layers consist of a transparent pattern layer **545** arranged furthest away from the diaper **501**, a background layer **546** arranged closest to the diaper **501**, and an intermediate layer **547** arranged between the pattern layer **545** and the background layer **546**. A pattern **518** in the form of the text "TENA" is arranged on the transparent pattern layer **545**.

The pant diaper **501** is characterized first and foremost in that the intermediate layer **547** of the label **519** is essentially transparent in a first state, in conjunction with which the pattern **518** is visible against the background layer **546** through the transparent intermediate layer **547**, because the background layer **546** and the pattern **518** exhibit essentially different shades of colour. When the intermediate layer **547** is subjected to elongation, the intermediate layer **547** is transformed into a second, essentially less transparent state, in conjunction with which the shade of colour of the intermediate layer **547** changes to a shade of colour that is essentially the same shade of colour as the shade of colour of the pattern **518**, in conjunction with which the pattern **518** becomes essentially invisible against the intermediate layer **547**.

When the pant diaper **501** is put on a wearer, the pant diaper **501** is stretched around the wearer's waist, especially when the pant diaper **501** is pulled over the wearer's hips. The waist elastic **525** of the pant diaper **501** is stretched out in this case from its initially contracted state, in conjunction with which the label **519** is elongated together with the waist elastic **525**.

When the intermediate layer **547** of the label **519** is elongated in conjunction with the application of the pant diaper **501** on a wearer, the intermediate layer **547** is transformed automatically into its second state, in conjunction with which this second state exhibits significantly less transparency compared with the first, non-elongated state. The background layer **546** in this case is essentially concealed by the intermediate layer **547**, in conjunction with which the intermediate layer **547** constitutes a new background for the pattern **118**.

The shade of colour of the pattern **518** has been selected intentionally so that it harmonizes with the shade of colour of the intermediate layer **547** once this has been transformed into its second, essentially opaque state, in conjunction with which the shades of colour of the pattern **518** and the intermediate layer **547** essentially merge together.

In alternative embodiments, the three layers **545**, **546**, **547** of the label can naturally be replaced by separate layers which are attached to the pant diaper **501** in the correct sequence.

FIG. **6***a* shows a belt diaper **601** in accordance with the invention from the side which, when it is being worn, is intended to face towards the wearer, and FIG. **6***b* shows the same belt diaper **601** from the opposite side.

The designations used in FIGS. **6***a* and **6***b*, which have a corresponding designation in one or other of the preceding figures, have the same designation digit in the numerical series **600-699** as the corresponding designation in the lower numerical series in earlier figures.

The belt diaper **601** differs from an open diaper in that its attachment arrangement comprises an elastic belt **628** intended to enclose the wearer's waist, in conjunction with which the belt comprises a fixing device **627** for fixing the belt **628** around the wearer's waist.

The belt **628** is attached to a rear transverse edge **615** and extends in a transverse direction in relation to the absorption body **606** of the belt diaper **601**.

In alternative embodiments, the belt diaper **601** can comprise two belt halves, in which case the respective half of the belt is joined to the liquid-permeable covering layer **602** and/or the backing layer **604** of the belt diaper **601** on the longitudinal edges **612**, **613** of the belt diaper **601** next to the rear transverse edge **615**.

The attachment arrangement also comprises two front fixing devices **640** arranged on the longitudinal edges **612**, **613** of the belt diaper **601** next to the front transverse edge **614**. The front fixing devices **640** are intended to be fixed to the belt **628** in conjunction with the application of the belt diaper **601** to a wearer.

The front fixing devices **640** comprise hook-and-loop elements **641** intended to interact with the side of the belt **628** that is intended to face away from the wearer when the diaper is being worn.

In alternative embodiments, the front fixing devices **640** can comprise adhesive elements intended to be fixed to the surface of the belt **628** facing away from the wearer. The belt **628** in this case must include surfaces intended to interact with the adhesive elements.

When the belt diaper **601** is to be applied to a wearer, the belt **628** is fixed around the wearer's waist as a first stage. The absorption part of the belt diaper **601** comprising, among other things, the front transverse edge **614** and the absorption body **606**, is then passed between the wearer's legs, after which two front fixing devices **640** are finally attached to the side of the belt **628** facing away from the wearer.

A label **619** comprising a pattern **618** is arranged on the elastic belt **628** of the belt diaper **601**. The label **619** comprises a pattern layer **645** and a background layer **646**. The label **619** is attached to the side of the elastic belt **628** that faces away from the wearer when the diaper is being worn, in conjunction with which the background layer **646** faces towards the belt **628**.

The belt diaper **601** is characterized first and foremost in that the pattern layer **645** of the label **619** is essentially transparent in a first state, and in that the pattern layer **645** is transformed into an essentially more opaque state when it is subjected to elongation. The pattern layer **645** is thus a layer which constitutes both the pattern layer **645** and the intermediate layer **647** of the belt diaper **601**. The pattern **618** is accordingly arranged on the side of the pattern layer **645** that faces away from the background layer **646**.

A pattern **618** in the form of the text "TENA" is arranged on the surface of the pattern layer **645** that faces away from the background layer **646**, that is to say on the outward-facing surface of the pattern layer **645**. The pattern **618** is visible because the pattern **618** and the background layer **646** exhibit different shades of colour, and because the combined pattern layer **645**/intermediate layer **647** are in the first, essentially transparent state.

The pattern layer **645** achieves its second state after elongation of the label **619**, in conjunction with which elongation occurs in conjunction with the elongation of the belt **628** when it is applied around the wearer's waist.

When the pattern layer **645**/intermediate layer **647** is subjected to elongation, it is transformed into its second, essentially less transparent state, in conjunction with which the shade of colour of the pattern layer **645** is changed to a shade of colour which is essentially the same shade of colour as the shade of colour of the pattern **618**. The pattern **618** in this case essentially merges with the pattern layer **645**, in conjunction with which it becomes essentially invisible.

Elongation is brought about when the belt **628** of the belt diaper **601** is stretched around the wearer in conjunction with putting the belt diaper **601** on the wearer.

The transition from the first, essentially transparent state of the pattern layer **645** to the second, significantly less transparent state thus takes place automatically as a natural part of the application procedure for the belt diaper **601**.

The shade of colour of the pattern **618** has been selected intentionally so that it harmonizes with the shade of colour of the pattern layer **645** once this has been transformed into its second, essentially transparent state.

This embodiment means that there is no requirement for a separate layer, the sole purpose of which is to contain the pattern, which reduces the costs relating to the invention.

The label **619** comprising the pattern **618** can naturally be provided with adhesive on the side that is intended to be attached to the belt **628**, in conjunction with which no separate adhesive equipment for the attachment of the label **619** is required on the machine which manufactures the belt diapers **601**.

A label **619** comprising a pattern **618** can, in alternative belt diapers **601**, be positioned on the backing layer **604** in conjunction with the front transverse edge **614**. For belt diapers **601** which exhibit two belt halves, it is also conceivable for the pattern **618** to be positioned on the backing layer **604** adjacent to the rear transverse edge **615**.

It is also conceivable for patterns **618** to be arranged on labels **619** positioned on the front and/or rear end part of the belt diaper **601** or on the front fixing devices **640**.

It is also naturally possible to execute labels consisting of only two layers and an initially visible pattern, where the pattern is essentially rendered invisible manually as described for the diaper **301** in FIGS. **3***a* and **3***b*.

The invention also extends to all conceivable combinations of the described illustrative embodiments.

Furthermore, the invention is not restricted to the above-mentioned illustrative embodiments, but is naturally applicable to other embodiments within the scope of the following patent claims, and equivalents thereof.

The invention claimed is:

1. An absorbent article for disposable use, the article comprising a first layer including at least one pattern formed thereon in a color, wherein in a first mode of the first layer, the first layer is transparent except where the pattern is formed,

the first layer superimposed on a background layer, the background layer and the pattern having essentially a same shade of color so that the pattern is not visibly discernable when superimposed over the background layer when the first layer is transparent in the first mode of the first layer; and

the absorbent article optionally including an intermediate layer arranged between the pattern and the background layer, the intermediate layer exhibits a first, essentially transparent state in a first mode of the intermediate layer such that the pattern is not visibly discernable against the background layer through the intermediate layer in the first mode of the intermediate layer and when the first layer is in the first mode, and the intermediate layer is caused by elongation to be transformed into a second essentially opaque state in a second mode of the intermediate layer and the first layer remains in the first mode;

wherein if the optional intermediate layer is not included, the first layer is caused by elongation to be transformed into a second essentially opaque state in a second mode of the first layer, such that the pattern is visibly discernable when the first layer exhibits the second, essentially opaque state in the second mode of the first layer except where the pattern is formed.

2. The absorbent article in accordance with claim **1**, wherein the intermediate layer, if included, exhibits an essentially different shade of color than the pattern when the intermediate layer exhibits the second, essentially opaque state, such that the pattern is visibly discernable against the intermediate layer when the intermediate layer is in the second mode of the intermediate layer.

3. The absorbent article in accordance with claim **1**, wherein the background layer comprises a liquid-permeable covering layer or a backing layer of the article.

4. The absorbent article in accordance with claim **1**, wherein, if the intermediate layer is included, the pattern is arranged directly on the intermediate layer, in conjunction with which the pattern is arranged on a side of the intermediate layer that faces away from the background layer.

5. An absorbent article for disposable use, the article comprising:

a background layer;

a layer including at least one pattern formed on the layer, the layer being transparent except where the pattern is formed, the pattern superimposed on the background layer; and

at least one intermediate layer arranged between the pattern and the background layer, the at least one intermediate layer exhibits a first, essentially transparent state in a first mode, and the at least one intermediate layer is caused by elongation to be transformed into a second essentially opaque state in a second mode, wherein

the pattern and the background layer exhibit essentially different shades of color, such that the pattern is visibly discernable against the background layer through the intermediate layer when the intermediate layer exhibits the first, essentially transparent state in the first mode, and the pattern and the intermediate layer exhibit the same shade of color when the intermediate layer exhibits the second, essentially opaque state in the second mode, such that the pattern is not visibly discernable against the intermediate layer.

6. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer and the layer including the pattern are laminated together and constitute a prefabricated label.

7. The absorbent article in accordance with claim **6**, wherein the prefabricated label contains the background layer.

8. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer is attached to an elasticated surface of the article, in conjunction with which the at least one intermediate layer is elongated automatically when the elasticated surface to which it is attached is elongated.

9. The absorbent article in accordance with claim **8**, wherein the at least one intermediate layer is arranged in an elasticated waist part of the absorbent article.

10. The absorbent article in accordance with claim **8**, wherein the at least one intermediate layer contracts when the elasticated surface to which the at least one intermediate layer is attached contracts.

11. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer is arranged on an elasticated belt of the absorbent article, in conjunction with which the at least one intermediate layer is elongated automatically when the elasticated belt is elongated.

12. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer is arranged on at least one elasticated attachment flap of the absorbent article, in conjunction with which the at least one intermediate layer is elongated automatically when the at least one attachment flap is elongated.

13. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer is intended to be elongated manually in order to cause the at least one intermediate layer to be changed from the first, essentially transparent state to the second, essentially opaque state.

14. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer exhibits a combined opacity of not more than 70.5% in accordance with the method described in ISO 2471:1988 when the at least one intermediate layer is in the first state.

15. The absorbent article in accordance with claim **5**, wherein the at least one intermediate layer exhibits a combined opacity of at least 76.2% in accordance with the method described in ISO 2471:1988 when the at least one intermediate layer has been transformed into the second state.

16. The absorbent article in accordance with claim **5**, wherein changing the at least one intermediate layer from the first state to the second state is achieved by elongating the at least one intermediate layer by 10-200%.

17. The absorbent article in accordance with claim **5**, wherein transition of the at least one intermediate layer from the first, essentially transparent state to the second, at least partially opaque state is irreversible.

18. An absorbent article for disposable use, the article comprising at least one pattern of a color, the pattern superimposed on a background layer having essentially a same shade of color as the at least one pattern, and at least one layer arranged over the background layer, the at least one layer exhibits a first, essentially transparent state in a first mode such that the pattern is not visibly discernable against the background layer through the at least one layer when the at least one layer exhibits the first, essentially transparent state in the first mode, and the at least one layer is caused by elongation to be transformed into a second, essentially opaque state in a second mode such that the pattern is visibly discernable against the at least one layer when the at least one layer exhibits the second, essentially opaque state in the second mode.

19. An absorbent article for disposable use, the article comprising at least one pattern of a color arranged on a

surface of a pattern layer, the pattern layer including an intermediate layer and being superimposed on a background layer having a different shade of color than the color of the at least one pattern, the pattern layer exhibiting a first, essentially transparent state in a first mode in which the pattern layer is essentially transparent except where the pattern is arranged such that the at least one pattern is visibly discernable against the background layer through the pattern layer in the first mode, and the pattern layer is caused by elongation to be transformed into a second state in a second mode in which the pattern layer exhibits a color that is essentially the same as the color of the at least one pattern such that the pattern is not visibly discernable against the pattern layer in the second mode.

20. An absorbent article for disposable use, the article comprising:

a top layer having a pattern of a color on it;

a background layer of the same color as the pattern;

wherein the pattern is superimposed on the background layer; and

optionally, a third layer arranged between the top layer and the background layer;

at least one of the top and third layers exhibits a first, essentially transparent state in a first mode of the to layer and third layers, respectively, the transparent state of the top layer being a state where the top layer is essentially transparent except where the pattern is provided, and the at least one of the top and third layers is caused by elongation to be transformed into a second essentially opaque state in a second mode of the top layer and third layers, respectively;

wherein the transformation of the at least one of the top and third layers affects whether an appearance of the pattern is visibly discernable.

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